the OIL AND GAS JOURNAL

DECEMBER 19, 1955

Here's the opposition's side in the . . .

Fight Over Gas Control

Page 42

Humble poses the question . . .

Are Water Flooders Pampered?

Page 50

In refinery maintenance . . .

Chemical Cleaning Is Cheaper

Page 78

A 20-year old pipeline booster station goes automatic. p. 92

IDECO'S 400-ton "Big Shorty" block takes fleet angles in stride with TIMKEN® bearings

HERE'S how engineers at IDECO, one of the Dresser Industries, solved the thrust problem set up by fleet angles on the lines of this "Big Shorty" block. They mounted the sheaves on Timken® tapered roller bearings. Timken bearings are *tapered* to take the heavy thrust loads, as well as radial loads, in any combination. They keep the sheaves in positive alignment regardless of fleet angle or line load, give the 400-ton capacity "Big Shorty" block maximum stability.

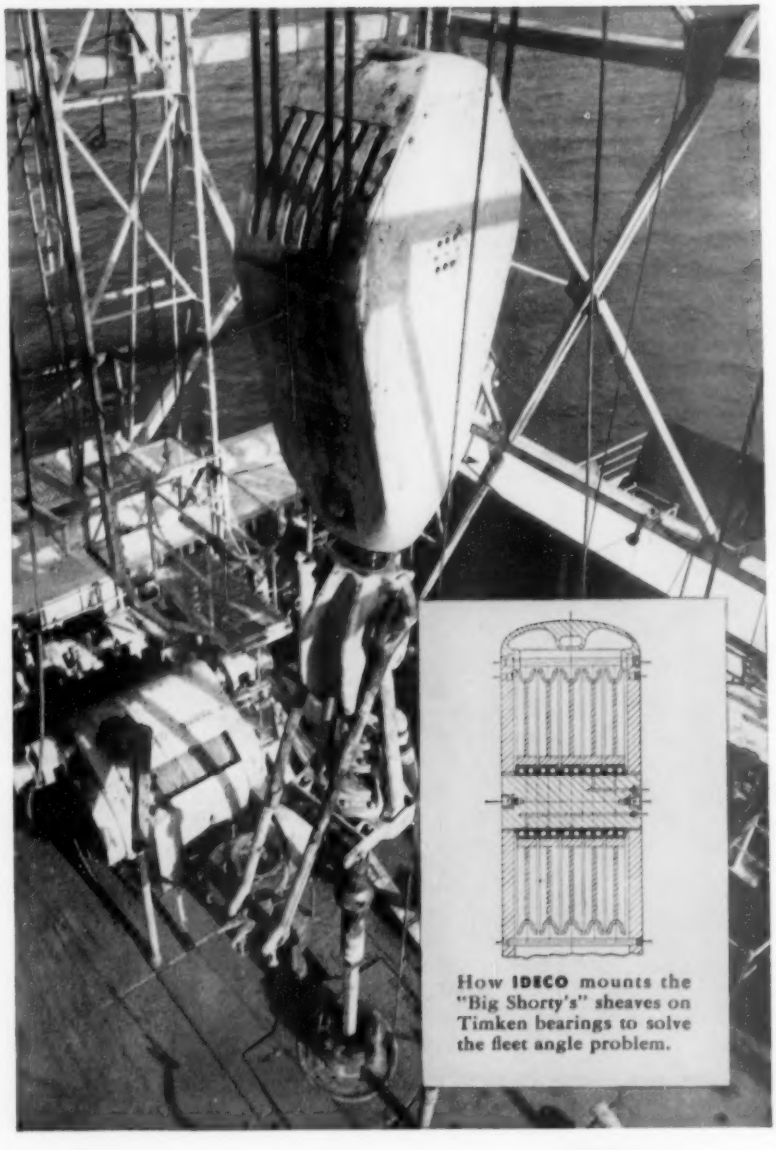
Timken bearings are designed to roll true and they're precision-made to live up to their design. As a result, the sheaves rotate freely and easily, even with a full weight of drill string, reducing line slippage and wear. And Timken bearings take heavy loads because they have full line contact between rollers and races. The rollers and races have shock-resistant cores under hard, wear-resistant surfaces.

Timken bearings cut lubrication expense, too. They keep the block's sheaves concentric with its center pin, making closures more effective. This keeps lubricant in, keeps dirt and moisture out.

Ideco equips its entire line of traveling and matching crown blocks with Timken bearings. The line includes 100-ton, 160-ton, and 260-ton traveling blocks as well as the 400-ton "Big Shorty" block.

When you buy or build machinery, be sure you get the best. Always look for the trade-mark "Timken" stamped on the bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



How **IDECO** mounts the "Big Shorty's" sheaves on Timken bearings to solve the fleet angle problem.

DESIGN LEADERSHIP

The first Timken tapered roller bearing was produced in 1898. Since then the one-piece multiple perforated cage, wide area contact between roller ends and ribs, and every other important tapered roller bearing improvement have been introduced by The Timken Roller Bearing Company.

The Timken Company leads in: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. special analysis steels.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ⊂⊃ THE TIMKEN TAPERED ROLLER ⊂⊃ BEARING TAKES RADIAL ↓ AND THRUST →◫← LOADS OR ANY COMBINATION

A glance ahead . . . at press time

These trends will make TOMORROW'S NEWS

A major company will build its own atomic reactor. Early results in its radiation-processing studies look so good that original plans for isotope sources and particle accelerators already appear inadequate.

Pembina will become Canada's largest producing field next spring. It's now producing nearly 75,000 bbl. per day.

Enough new wells may be added before March 1 to surpass Redwater's 84,000 bbl. daily. Canadian observers envision nearly 1,000 new wells for the field during 1956.

Look for Canadian crude to continue its inroads into U. S. markets. One Michigan refiner has nearly completed a deal to buy 5,000 bbl. daily to be delivered through the Interprovincial system. Another Michigan refiner currently is negotiating for a supply of Canadian crude.

With dollars of both countries now about equal, Canadian crude is 3 to 4 cents a barrel more attractive than a few weeks ago.

Failure of Canadian crudes to advance in price following the 10-cent hike in the Illinois basin will help to widen potential outlets for Dominion oil in this country.

Manufacturers of natural-gas liquids are encouraged by trends affecting their markets.

Things to look for: additional developments in underground storage, more pipeline movement of products, new processing applications, an increase in motor-fuel volatility, and new outlets.

Higher tanker rates, plus a more aggressive coal industry, are bringing conversions from fuel oil to coal at some eastern points. Industrial natural gas also is losing some markets to coal in the same areas.

Asphalt sales for 1955 are expected by member companies of the Asphalt Institute to total 12,923,912 tons—a whopping 16 per cent increase over 1954.

Another record production year in 1956 is expected, based on the assumption that some kind of federal highway program is sure to be enacted. In spite of an expected big jump in demand, the companies scotch any talk of a possible shortage.

An important new use for microballoons has been proven. Originally designed to control evaporation losses, these minute plastic bubbles have drastically cut corrosion in the vapor space of storage tanks handling sour stocks. Watch for important developments along this line—from Kansas.

the OIL AND GAS JOURNAL

DECEMBER 19, 1955 • VOLUME 54 • NUMBER 33

THE STAFF

TULSA OFFICE
211 South Cheyenne Ave.
Phone Diamond 3-6291

Kenneth S. Barnes ... Editor
Henry D. Ralph ... Chief Editorial Writer
Ted A. Armstrong ... News Editor
Gerald L. Farrar ... Engineering Editor
Dr. Frank J. Gardner ... Exploration Editor
Paul Reed ... Pipeline Editor
John C. Reidel ... Petrochemical Editor
C. O. Willson ... Consulting Editor
W. L. Nelson ... Technical Editor
Lynn M. Nichols ... Presentation Editor
John C. Casper ... Economics Editor
Neil Williams ... Associate Editor
Norman S. Morrisey ... Drilling-Development Editor
Robert G. Deering ... Associate Pipeline Editor
R. B. Tuttle ... Equipment Editor
W. A. Franklin ... Assistant to Presentation Editor
Carl Hoot ... District Editor
Carl J. Lawrence ... District Editor
John C. McCaslin ... District Editor
John M. McGivern ... District Editor
W. A. Bachman ... District Editor
Gene T. Kinney ... District Editor
J. O. Scott ... District Editor
LaWanda Turner ... Readership Research
Helen Brown ... Editorial Assistant
Alice Burt ... Editorial Assistant
Aileen Cantrell ... Editorial Assistant
C. Dudley Johnston ... Art Director
Jo Jeanne Speaker ... Staff Artist

NEW YORK OFFICE
500 Fifth Avenue
Phone LOngacre 4-6160

George H. Weber ... Refining Editor
Paul Swain ... International Editor
Ray G. Gibson ... District Editor

HOUSTON OFFICE
802 Sterling Building
Phone CApitol 4-7726

F. Lawrence Resen ... District Editor
Edwin McGhee ... District Editor
Joe Reilly ... District Editor

DALLAS OFFICE
1238 Mercantile Bank Building
Phone STerling 3074

Robert J. Enright ... District Editor

LOS ANGELES OFFICE
650 South Grand Avenue
Phone VAndike 0722

D. H. Stormont ... District Editor
William T. Smith ... District Editor

WASHINGTON OFFICE
621 Albee Building
Phone District 7-1710

Bertram F. Linz ... District Editor

Correspondents at Denver, Pittsburgh, Calgary, Columbus, Ashland, Ky., Oil City, Pa., Mount Pleasant, Mich., Melbourne, Australia; Regina, Sask.; Chatham, Ont.; and Casper, Wyo.

The Oil and Gas Journal, Published Mondays, copyright 1955, by The Petroleum Publishing Co. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. United States and foreign rates to the petroleum industry, 1 year $4, 2 years $7, 3 years $8.

IN THE NEWS

General Interest:

Heyke Outlines Opposition to Harris Bill ... 42
Texaco's 1956 Budget is Record $325-Million ... 49
Oil-Field Truckers Fight Cut in Rates ... 54
Phillips Builds World's Biggest Steel Tank ... 56
Arab Tension Mounting Over Border Dispute ... 61

Production:

Louisiana May Modify Gas Proration Order ... 46
Water-Flood Policy Challenged in Texas ... 50
Atlantic Starts High-Pressure Gas-Injection Project ... 58

Refining:

El Paso Natural Negotiates for Malco Refinery ... 56
Socony-Houdry Patent Suit Settled ... 59
Shell Shoots for Bigger Fuel-Oil Output ... 60
Refinery May Be Built in West Africa ... 60

Drilling:

Research Developments Point to Faster Drilling ... 45
Kermac Adds New Mobile Platform to Offshore Fleet ... 53

Pipelines:

Brown & Root Makes 12-Mile Pipeline Shove ... 55
California May Get Another Big-Inch Gas Line ... 56
Iranian Products Line Is Started ... 62
First Leg of Caucasus-Moscow Gas Line Completed ... 62

Government:

N.P.C. Gets Extension for Another Year ... 45
Federal Control of Gas Sales Tightened ... 49
U. S. Polls Industry on Need for Offshore Sale ... 53
Jersey Wins Round in $36-Million Government Suit ... 57

Exploration:

World's Deepest Well Still 'Kicking' ... 48
Deep Mississippi Wildcat Discovery Indicated ... 59
New Sooner Trend Stretches 30 Miles ... 127
South Texas' Thriving Olmos Trend ... 129

OIL AND GAS PIPELINES • REFINING • PETROCHEMICALS
EXPLORATION • DRILLING • PRODUCTION • FIELD PROCESSING

. . . an integrated magazine serving an integrated industry

TECHNOLOGY—OPERATION

Drilling—Production:

New Rigs Meet Changed Drilling Problems **63**

By Frederick D. Furber

Here is how one company solved problems in new drilling areas in the Illinois basin by using new highly portable rigs to cope with large-hole requirements.

How to Halt Subsidence in Wilmington Oil Field **66**

By Frank G. Miller and W. H. Somerton

Water-injection operations should effectively check surface settling and substantially increase the ultimate economic recovery of oil.

Field Processing **101**

Refining—Processing:

Forced Draft Cooling Tower Stages A Comeback **73**

By Art Smith

Limitations of earlier forced-draft cooling towers in reactor air distribution and recirculation of discharged vapor (with resultant effect on cooling ability) have now been overcome.

Socony-Mobil Refinery Uses Evaporation Pond for Waste Water **75**

By Gerald L. Farrar

All of the waste water from Socony's Casper, Wyo., refinery now runs into an evaporation pond after treatment in the plant.

Gulf Completes Port Arthur Testing Laboratory **76**

Chemical Cleaning in the Refinery **78**

By John C. Reidel

This maintenance tool is being applied on an increasing scale and often results in direct money savings and in further savings through reduction of down time.

Equipment Design and Operation **97**

Questions on Technology **99**

Foreman's Page **103**

Pipelining:

Booster Station Goes Automatic **92**

By Robert G. Deering

Here is how Detroit Southern pipeline company's automatic booster station at Flat Rock, Mich., is operated with both suction and discharge-valve control.

Pipeline Patrol: How to Protect Valve-Operator Motors **105**

By George H. Beck

Here is a method that can be used to prevent burning out motor operators, based on consideration of electric-motor overload relays.

Two-Cycle Engines Can Run at Varied Speed **108**

There is little if any difference between the abilities of two-cycle and four-cycle engines to operate at varying speeds. The two-cycle engine will scavenge well at almost any speed.

DEPARTMENTS

A Glance Ahead	1	Drilling Contractors	110
They Say	28	Equipment Digest	113
Calendar of Events	33	Trade Literature	117
Journally Speaking	37	Equipment Men in News	124-168
Editorial	39	Exploration Highlights	134
This Week	41	Personals	155
Watching Washington	47	Statistical Summary	160
International News	60	Drilling Statistics	161
Pipeline Patrol	105	Supply Statistics	162
		Refining Statistics	163
		Demand Statistics	164
		Classified Advertising	165
		Advertisers' Index	169

TECHNICAL FEATURES

Engineering Reference Section	97-103
Equipment Design and Operation	97
Questions on Technology	99
Field Processing	101
Foreman's Page	103

* SEA • BRACKISH • POLLUTED

How to make any water* pure

for DRINKING • PROCESSING • DRILLING MUD MAKE-UP

WASTE HEAT EVAPORATORS are particularly adaptable to offshore drilling platforms, tenders and diesel barges. Practically no scale removal. Potable water is produced from the sea at zero cost because unit uses waste heat from rig's diesel engines . . . transmitting it through heat exchangers charged with sea water. Hot water flashed into a vacuum chamber is partially converted into steam, which is then condensed on cooling coils for the output of distilled water for "mud" make-up, drinking, etc. Unit above has a capacity of 300 gph — larger capacities to your specifications.

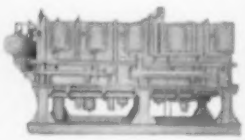
Investigate the diversified types of Cleaver-Brooks evaporators — engineered for greatest heat and power economies

The broadened line of Cleaver-Brooks evaporation equipment now includes types for a wide variety of operating conditions—and to answer *any* need for pure potable water or high quality process water.

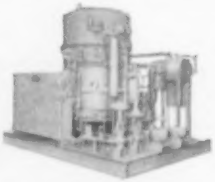
- Sea water, brackish water or polluted streams may be used as a prime source, thus eliminating independent pipe lines, trucking or barging.
- Distillate is uniform in quality — regardless of raw water source.
- Evaporators are completely packaged, delivered insulated and fully assembled, ready to receive supply and discharge lines.
- Stationary or mobile units operate independently and automatically after initial starting.

Cleaver-Brooks is highly qualified to design and fabricate evaporators (including special heat exchangers) to your specifications. For complete details, write: Cleaver-Brooks Company, Special Products Division, Dept. P, 377 E. Keefe Ave., Milwaukee 12, Wis., U.S.A., Cable Address: CLEBRO—Milwaukee—all codes.

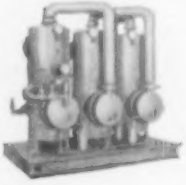
FLASH-TYPE EVAPORATOR—Combination of four (4) 50,000 gallons-per-day evaporators with a total distilled water capacity of 200,000 gallons per day. Unit will provide entire water supply for super carrier of the U.S.S. Forrestal class. Low-pressure steam is bled from propulsion turbines.



VAPOR COMPRESSION EVAPORATOR (Model S300 D0) — Provides pure water at approximately one-half the cost of other methods. Specially suited for tankers and other bulk-cargo vessels. Distilled water capacity—300 gallons per hour.



TRIPLE-EFFECT EVAPORATOR (Model F200 TE) — Exceptional economy where sufficient quantities of inexpensive low-pressure steam is readily available. Will produce 200 gallons per hour from softened city water supply.



Cleaver-Brooks®

25th YEAR

BUILDERS OF EQUIPMENT FOR THE GENERATION AND UTILIZATION OF HEAT AND POWER

For HEAVY DUTY

MONARCH **WHYTE** STRAND

Wire Rope by MACWHYTE

MONARCH WHYTE STRAND Wire Rope is at home on today's fast, high-output equipment where heavy duty performance means savings.

There is a correct MONARCH WHYTE STRAND size and construction for every oilfield need. Give it an opportunity to serve you—you will be more than pleased with its performance.

Prompt shipment from stock can be made by Macwhyte distributors.

MACWHYTE COMPANY, 2916 Fourteenth Avenue, Kenosha, Wisconsin

Manufacturers of wire rope to meet the needs of all equipment: Internally Lubricated Wire Rope, PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cable and Assemblies, Monel Metal, Stainless Steel, and Plastic Coated Wire Rope, and Wire Rope Assemblies.

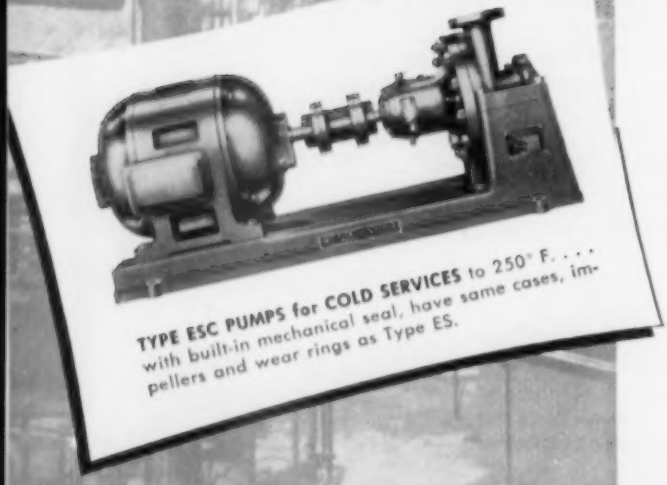
MILL DEPOTS
New York 4, 35 Water St.
Pittsburgh 19, 704 Second Ave.
Chicago 6, 228 So. Desplaines St.
St. Paul 14, 2356 Hampden Ave.
Ft. Worth 1, P. O. Box 605
Portland 9, 1603 N. W. 14th Ave.
Seattle 4, 87 Holgate St.
San Francisco 7, 188 King St.
Los Angeles 21, 2035 Sacramento

Wire Rope Catalog G-16 available on request.

MACWHYTE WIRE ROPE

Over 1,400 Wilson-Snyder ES and ESC Process Pumps

TYPE ES PUMPS for HOT SERVICES . . . with extra-deep, water-jacketed stuffing boxes and water-jacketed bearings for temperatures to 900° F.



TYPE ESC PUMPS for COLD SERVICES to 250° F. . . . with built-in mechanical seal, have same cases, impellers and wear rings as Type ES.

. . . PROVEN and ACCEPTED in 175 different Refining and Petrochemical Plants

IN ALL TYPES OF PROCESSING UNITS . . . including catalytic cracking and reforming, vacuum and atmospheric distillation, coking, hydrogen-finishing, ethylene and other light hydrocarbon fractionation, alkylation, polymerization, solvent extraction, treating and ammonia synthesis . . . these pumps are handling clean, corrosive or abrasive liquids—from 10 to 1,800 gpm, 40 to 1,000 feet head, sub-zero to 850° temperature, up to 600 ppsi vapor or suction pressure and up to 750 ppsi discharge pressure. Available in both end or top suction arrangement.

SELECTED BY ENGINEERS

. . . for their HIGH DEPENDABILITY and LOW MAINTENANCE COSTS, resulting from the following design features:

- Head-capacity, temperature and pressure range is broader than any other type single-stage process pump.
- They have the greatest possible interchangeability of parts between sizes and also between hot and cold service types.
- They have the strongest cases, extra large shafts, extra strong sloping-top base plates and are completely supported at the centerline.
- They have extra large impeller eye areas at minimum height centerline for lowest NPSH requirements and special volute design for smooth running over complete capacity range.
- They have high efficiency with flat performance curves, so that capacities can be increased without installing large diameter impellers.
- Both hot and cold types have spacer-type couplings so pump can be dismantled for servicing without disturbing suction or discharge piping or driver.
- Every pump is given a running test before shipment.

LET US QUOTE ON YOUR REQUIREMENTS

OIL WELL SUPPLY

DIVISION

UNITED STATES STEEL CORPORATION

Executive Offices—DALLAS, TEXAS
Export Office—
30 ROCKEFELLER PLAZA
NEW YORK 20, N. Y.

Area Offices—
CALGARY, CANADA
CASPER, WYOMING.....COLUMBUS, O.
DALLAS, TEXAS.....HOUSTON, TEXAS
TULSA, OKLA.....LOS ANGELES, CALIF.

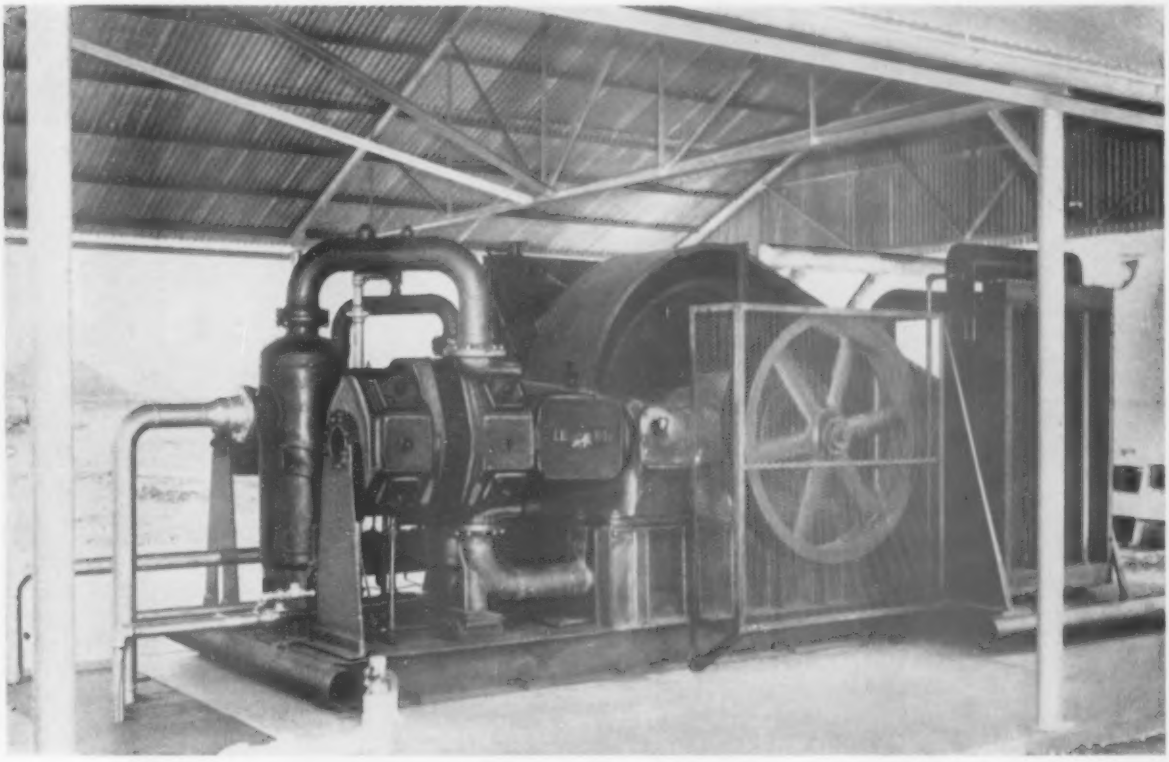
Branches Serving All Oil Fields

USS TRADE MARK

"OILWELL"

TRADE MARK

UNITED STATES STEEL



Screwdriver Maintenance Cuts Costs

...just another reason why Le Roi Gas-Booster Compressor design provides greater dependability and economy

Maintenance costs go way down when you can service gas compressor intake and discharge valves with a simple tool like a screwdriver. That is exactly what you can do with a Le Roi semi-portable, package-type, gas-booster compressor.

Valves on Le Roi gas-booster compressors are "Air-Cushioned."* Of simple design, they are practically wear- and breakage-proof valves that operate quietly and have exceptionally long life.

Not only do you cut maintenance costs because assembly and disassembly of Le Roi "Air-Cushioned"* valves is simple but, in addition, the valve assemblies are interchangeable.

Many Cost-Cutting Features

Easy, screwdriver maintenance is only one of many cost-cutting features built into every Le Roi gas-booster compressor. For example, the gas-compressor cylinder has intake on top and discharge on bottom for self-scavenging of any condensate. A removable cylinder liner in center cylinder section. Oil-tight crankcase with breather. Oil-level gauge for crankcase. Enclosed dust-tight distance piece between cylinder and frame. Metallic wiper rings. Force-feed gas-cylinder lubrication. Metallic-type, full-floating, Micarta stuffing-box packing. Micarta piston rings. Closed-end, forged connecting rod to eliminate strap and strap-bolt breakage.

One Package From One Source

With every Le Roi installation you get packaged-type power that is built, backed, guaranteed, and serviced by one dependable organization.

The Le Roi gas-booster line includes 5-7-9-11 and 13-inch stroke machines ranging in size to 300 hp — all Le Roi powered.

Write today for literature and complete information to Le Roi Oilfield Headquarters, 5000 45th West Avenue, P. O. Box 9478, Tulsa, Oklahoma. P-143

*"Air-Cushioned" is a trade name

LE ROI *Division of Westinghouse Air Brake Co.*

Milwaukee 1, Wisconsin

PORTABLE AIR COMPRESSORS · TRACTAIR · STATIONARY AIR COMPRESSORS · AIR TOOLS · ENGINES

NEW *Mack* B-80 SERIES—

a money-making giant for heavy oil field work

New features make this rugged six-wheeler more powerful, sturdier . . . and a greater work producer than even its great Mack predecessors!

GREATER DIESEL POWER. Mack's famous Thermodyne® Diesel is now turbo-charged to 205 h.p.; other turbo-charged diesel power up to 262 h.p. is available.

MORE BRAKING POWER. Mack Thermodyne Diesel engines are recognized as having more braking power than any other. Now new exhaust brakes increase their retardation by 50%, while adding greatly to brake lining life.

NEW TRANSMISSIONS. From 10 to 20 speeds, with a wide range of options of final drive ratios to meet any operating conditions. Complete one-box units—no auxiliary transmissions or two-speed axles are necessary.

SQUARE-CUT MILITARY FENDERS. Make the Mack B-80 series look even more like the sturdy work-champions they are! Functional too—they provide strong, steady working platforms.

IMPROVED MACK BALANCED BOGIE. Assures positive traction no matter what the load or terrain. Mack's exclusive Power Divider delivers torque to each wheel in proportion to its traction, eliminating useless wheel slippage and spinning.

UNITIZED CABS. Roomier, stronger, thoroughly ventilated Mack "B" cabs are more comfortable and fully accessible. "Unitized" construction—radiator, fenders and cab mounted as integral unit at 4 points—means longer cab life, greater stability.

FULL RANGE. 11 models to choose from, giving you a complete selection of sizes and capacities to meet your own needs exactly.

You get *more power—greater reserve* power—to pull through with any load, on the tightest schedules when you put new Mack B-80's on your jobs. And you get all the features that you need for top efficiency and performance in the field, too! For the full story, see your Mack branch or distributor.

3471

MACK TRUCKS **Empire State Building, New York 1, N. Y.**

ROCKWOOD ALL-PURPOSE FOAM can be used to blanket fires in alcohols, ethers, esters, ketones, as well as petroleum products.

Now... one FOAM extinguishes both petroleum and alcohol fires

New Rockwood All-Purpose FOAM does the work of two products. Simplifies training of fire fighting personnel and cuts down fire protection inventory. Rockwood All-Purpose FOAM quickly puts out fires in alcohols, ketones, ethers and similar water soluble materials as well as petroleum derivatives.

Rockwood All-Purpose FOAM reduces fire protection equipment for fire departments and plants which must deal with more than one type of fire hazard, and is ideally suited for Rockwood's SpotPROTECTION or fixed piping systems.

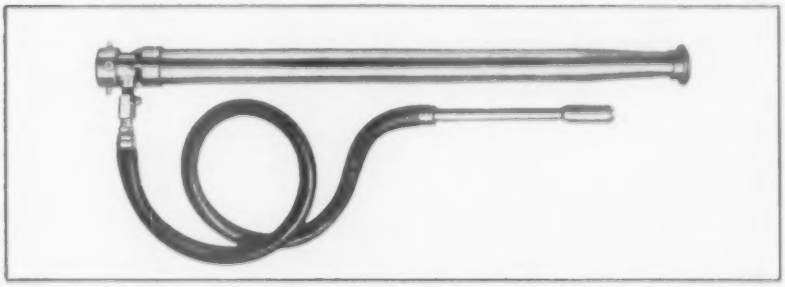
Rockwood All-Purpose FOAM is well suited for use by municipal fire departments, oil refineries, distilleries, chemical and other industrial plants.

Rockwood All-Purpose FOAM liquid with standard Rockwood FOAM nozzle provides the simplest, fastest means for extinguishing alcohol, solvent fires. The FOAM nozzle attaches to a hose connected to the discharge gate of a fire truck, hydrant or interior hose station.

Specify new Rockwood All-Purpose FOAM, put this versatile fire fighter to work for you.

ROCKWOOD SPRINKLER COMPANY

Engineers Water . . . to Cut Fire Losses



1½" STANDARD FOAM NOZZLE AND PICK-UP TUBE discharges 60 g.p.m. at 100 p.s.i. Range: approximately 55 feet.

SEND FOR THIS INFORMATIVE BOOKLET

ROCKWOOD SPRINKLER COMPANY
Portable Fire Protection Division
1063 Harlow Street
Worcester 5, Mass.

Please send me your illustrated booklet on Rockwood fire fighting products.

Name.....

Title.....

Company.....

Street.....

City.....Zone..State.....

BRONZE • STEEL • MONEL • ALUMINUM

swing joints

YOU CAN ALWAYS DEPEND ON . . . . .

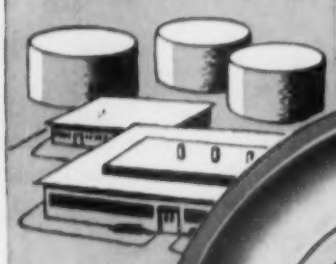
for unlimited flow line flexibility, greater load carrying capacity!

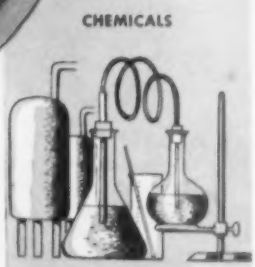
The high standard of OPW's Swing Joint performance results from expert designing, precision machining, exclusion of contamination, simple lubrication requirements, soundness of load carrying principle and perfect alignment at all times.

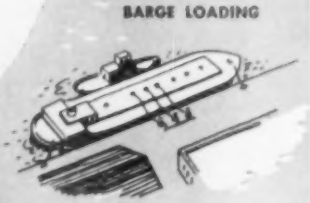
A wide range of styles and sizes makes possible many and varied applications for safely handling liquids of diversified viscosity at required temperatures and working pressures.

Exhaustive field research has directed OPW in planning a complete line of Swing Joints to fit all requirements.

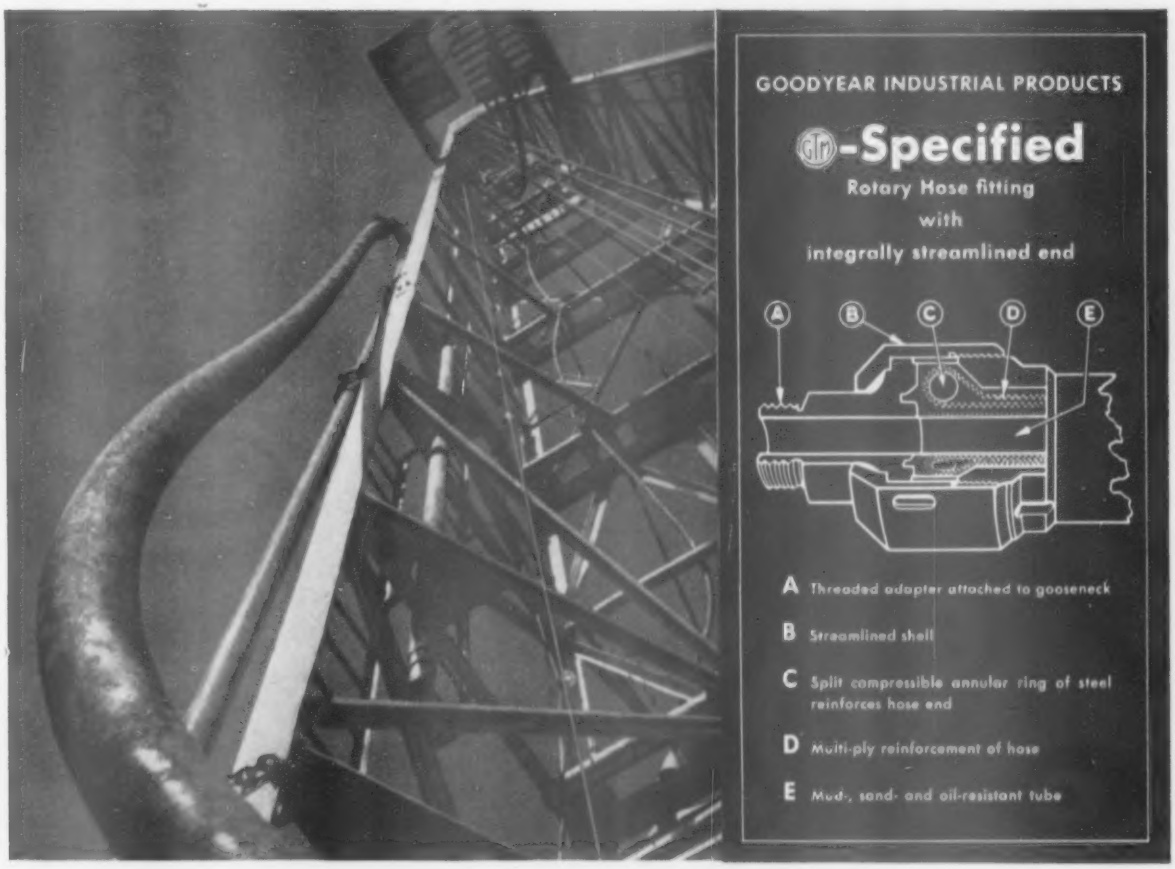
FREE CATALOG F-8
provides engineering data, sizes, styles, recommendations and prices.







OPW CORPORATION
2731 Colerain Ave.
Cincinnati 25, Ohio



Drills over 200,000 feet

completing 36 wells

IN 1948, operators of one Southwestern drilling rig needed a new rotary hose. The hose just retired had drilled a total of 73,000 feet of hole. They felt they could do better. They called in the G.T.M.—Goodyear Technical Man.

The G.T.M. recommended Style 3153-H Rotary Drilling Hose with its exclusive, factory-built-in coupling. This hand-built, steel-wire-and-cable-reinforced hose is designed for drilling down to 15,000-20,000 feet where extreme bottom hole pressures are encountered. The streamlined coupling gives fast connections, full flexibility and maximum flow.

RESULT: Under the high pressures it encounters, this hose has drilled 200,000 feet of hole—36 wells in seven years. And it's still going strong, despite very rough handling and many moves.

Full details on Style 3153-H are yours for the asking from the G.T.M., your Goodyear Distributor or Goodyear, Industrial Products Division, Akron 16, Ohio

ROTARY DRILLING HOSE and COUPLING by

GOODYEAR

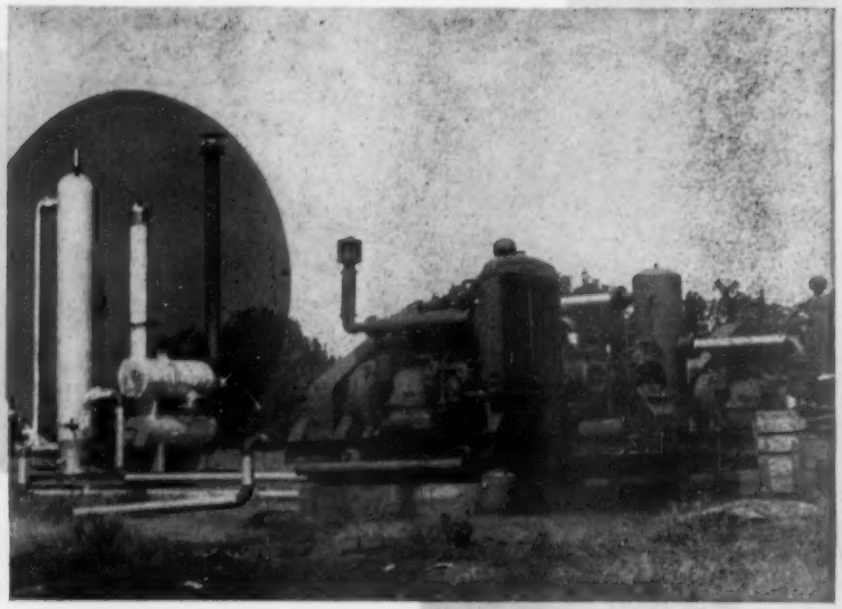
THE GREATEST NAME IN RUBBER

We think you'll like THE GOODYEAR TELEVISION PLAYHOUSE—every other Sunday—NBC TV Network

Difficult Dehydration

problems solved with M-C UNITS in series with Compressors . . .

If you are having difficulties in gas dehydration in conjunction with compression because of: low pressures; high temperatures; flow surges; ground and piping vibrations — Maloney-Crawford has the answer.



Maloney Crawford Glycol Dehydration units are especially adaptable for use in series with compressors. Because of our experience on many installations involving dehydration upstream, interstage, and downstream of compressors, Maloney-Crawford field engineers are fully qualified to make equipment recommendations on dehydration problems. Proper placement of the dehydrator and advice on pressure control and economical cooling devices can often result in lower initial cost, better dehydration and lower maintenance costs for the gas producer. Our engineers are available to discuss your problems.

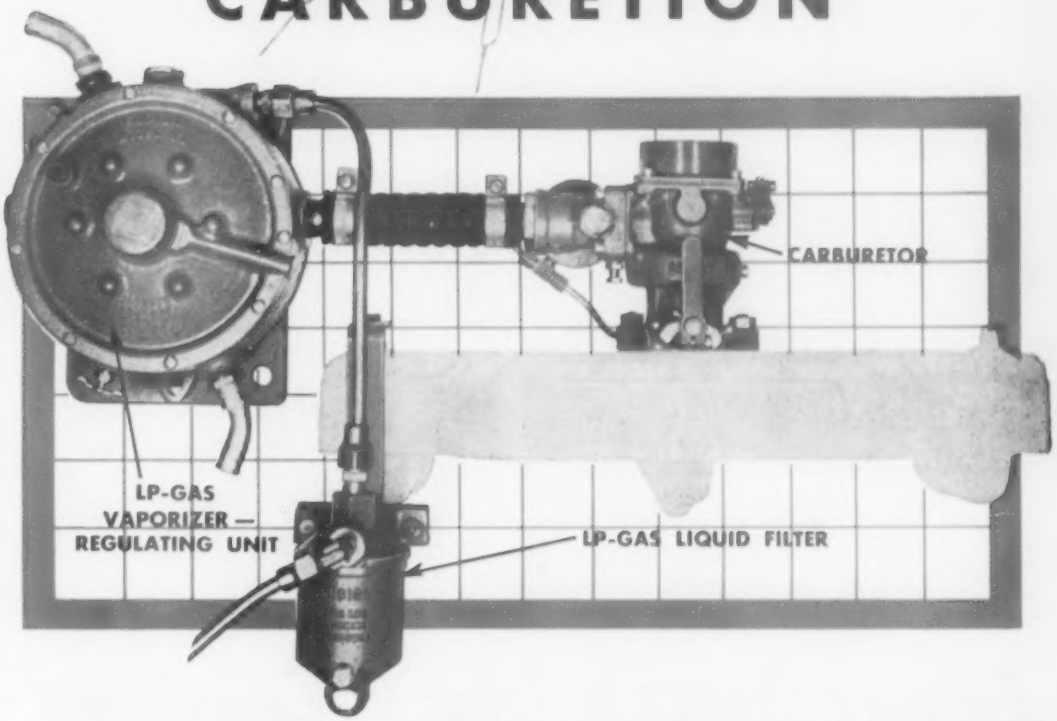
MALONEY-CRAWFORD TANK AND MANUFACTURING CO.

FACTORY AND GENERAL OFFICE: 38 North Peoria—Box 659—Tulsa, Oklahoma
EXPORT REPRESENTATIVE: Baird Lines—1017 Grand Central Terminal Bldg., New York 17, N. Y.
CANADIAN REPRESENTATIVE: Maloney-Crawford Tank & Service Company, Ltd.—Edmonton.
TEXAS PANHANDLE REPRESENTATIVE: Atlas Tank Company—Pampa, Texas.

MALONEY-CRAWFORD TANK & MFG. CO.

ENSIGN ENGINEERING PRODUCES INDUSTRY'S MOST DEPENDABLE

LP-GAS CARBURETION

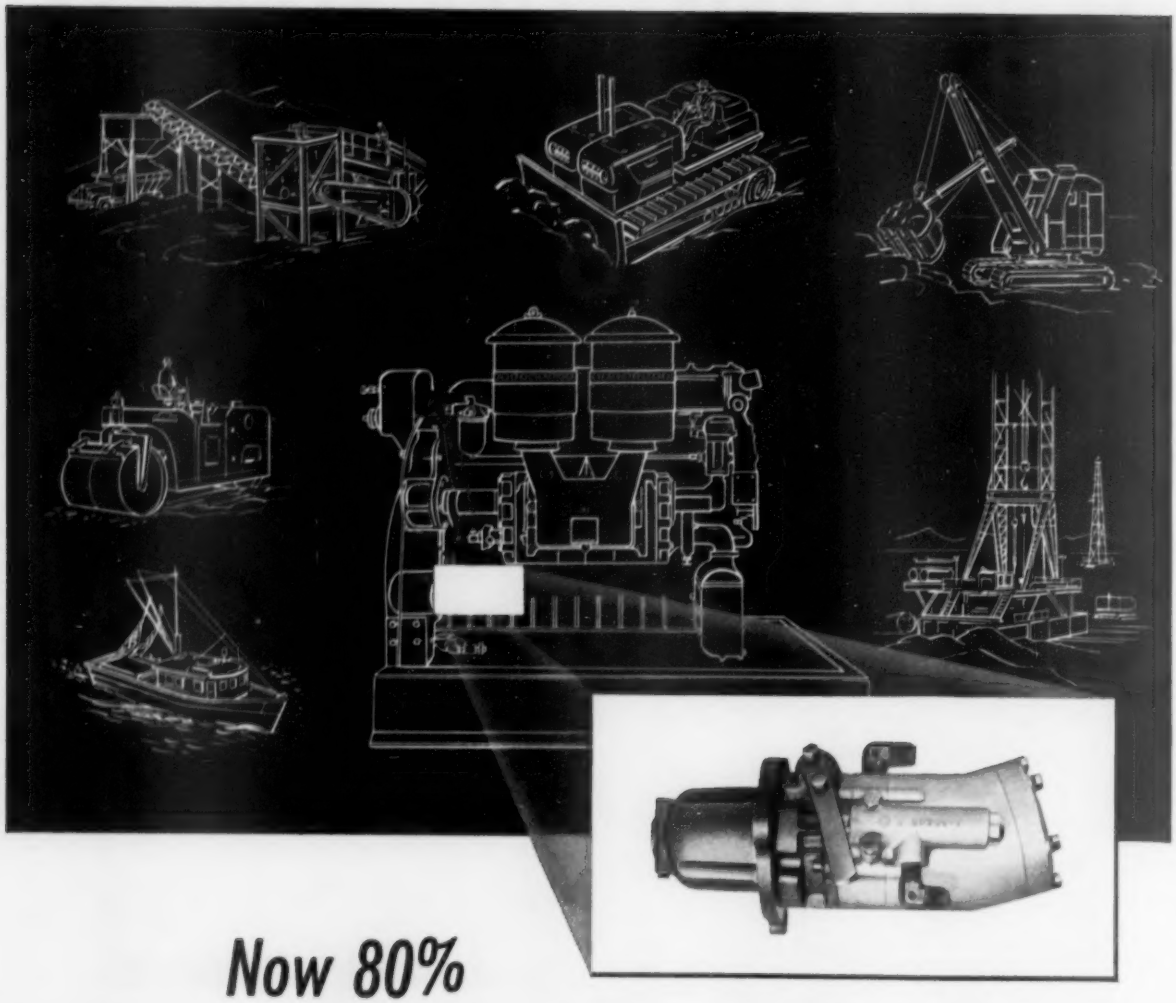


Carburetion is an art and in this business one learns by doing. For three generations Ensign Engineers have devoted their combined efforts exclusively to one single, solitary objective — how to make the best and most dependable carburetor. Results of this concentration of purpose are measured in terms of unparalleled gas engine performance. Proof of this comes in a quick glance at the automotive market. Today, hundreds of thousands of Ensign carburetors are in 'round the clock operation throughout the world rendering indisputable evidence that engines equipped with Ensign are easy to start, economical and run longer with minimum field maintenance.

Leading manufacturers of engines and engine powered equipment have adopted Ensign as standard equipment for their LP-Gas and Natural Gas models. Insist on Ensign — accept nothing less.

ENSIGN CARBURETOR COMPANY

7010 S. Alameda St., Box 229, Huntington Park, Calif.
Branch Factory, 2330 W. 58th St., Chicago 36, Illinois



Now 80%
Faster Detroit Diesel Cranking
with the new Low-Cost GM Hydrostarter

TESTS PROVE that a Hydrostarter gets a General Motors Detroit Diesel up to starting speeds 80% faster than regular starting systems.

That means fast, sure starts anywhere, anytime—means your GM Detroit Diesel-powered equipment starts *right now* as soon as you pull the starting lever, even at low temperatures or after your equipment has been idle for long periods.

With a Hydrostarter on your GM Detroit Diesel engine, you enjoy thousands of starts without parts replacement, maintenance or downtime expense because all components are self-lubricated and sealed against dirt.

You can order a Hydrostarter for your present engines or on your next GM Detroit Diesel. Your distributor has them available for you now—call him today or write direct for more information.

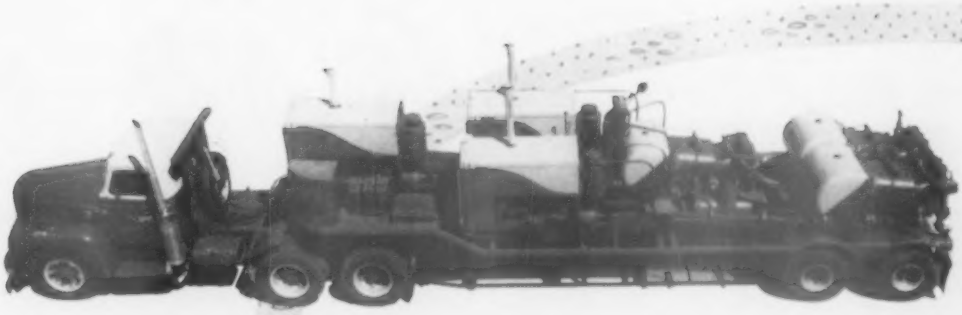
DETROIT DIESEL

Engine Division of General Motors

Single Engines . . . 30 to 300 H.P.

Multiple Units . . . Up to 893 H.P.

America's Largest Builder of Diesel Engines



uses lease crudes to create stable fracturing fluid

HALLIBURTON'S EMULSIFRAC

Most lease crudes can now be economically used by Halliburton to create a highly effective fracturing fluid. The fluid created with Halliburton's Emulsifrac is quite stable under fast pumping conditions. No breakdown occurs at rates as high as 15 bbls. per minute.

QUICKLY PREPARED AT WELL SITE

Emulsifrac fluid is basically lease crude oil emulsified to give it viscosity capable of carrying large amounts of sand. After fracturing, viscosity reduction is accomplished by an internal chemical breaker which permanently destroys the emulsifier. The sand carrying characteristics of Emulsifrac are excellent even under static conditions. In excess of 10 lbs. per gallon of fluid can be supported indefinitely. Emulsifrac fluid is quickly prepared at well site by either batch or continuous proportioning processes.

Reduce fracturing costs on your next well by utilizing economical lease crudes and Halliburton's Emulsifrac. Call your local or district office of the Halliburton Oil Well Cementing Company.

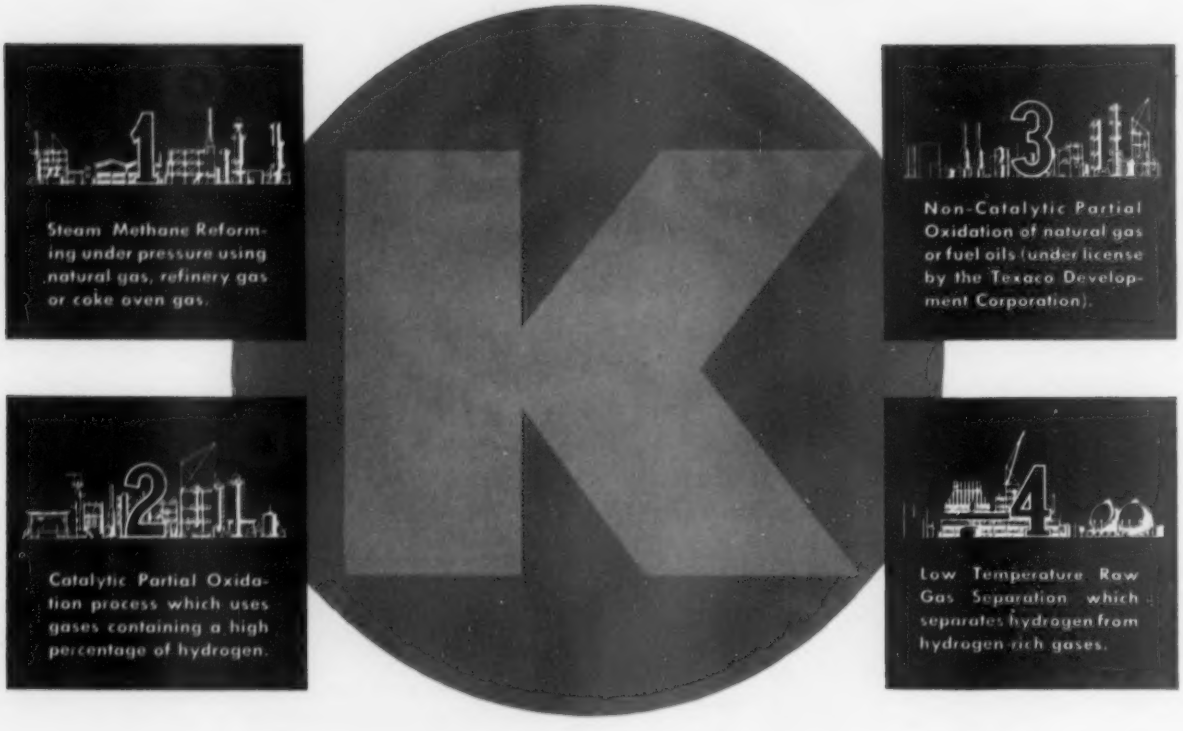
COMPLETE DATA SENT ON REQUEST

Get this valuable information for your Halliburton Service File.

HALLIBURTON FRACTURING SERVICES

250 SERVICE CENTERS—JUST MINUTES AWAY FROM ANY RIG

The Best Choice of Ammonia Processes


1
Steam Methane Reforming under pressure using natural gas, refinery gas or coke oven gas.
2
Catalytic Partial Oxidation process which uses gases containing a high percentage of hydrogen.
3
Non-Catalytic Partial Oxidation of natural gas or fuel oils (under license by the Texaco Development Corporation).
4
Low Temperature Raw Gas Separation which separates hydrogen from hydrogen-rich gases.

Each Designed for Optimum Efficiency at Different Type Locations

The M. W. Kellogg Company offers four different processes, outlined above, for the generation and purification of ammonia synthesis gas. The conversion phase in all uses the Kellogg-developed, quench-type reactor. With these four basic plant types, potential ammonia producers can be sure of a design which gives optimum results under practically any local operating conditions, including power and fuel as well as feed materials.

This flexibility in ammonia plant design is the result of M. W. Kellogg's many years of successful experience in engineering petroleum refineries and petrochemical plants for major producers both in the United States and abroad. For chemical manufacturers and refiners contemplating product improvement or diversification, it is a guarantee of low initial plant cost, high productive yield, and minimum operational costs.

Details of M. W. Kellogg's four basic types of ammonia plants are contained in a recent 12-page booklet, available on request.

PETROCHEMICAL PROCESSES AND PLANTS

CHEMICAL PROCESS DIVISION

THE M. W. KELLOGG COMPANY, 225 BROADWAY, NEW YORK 7, N. Y.

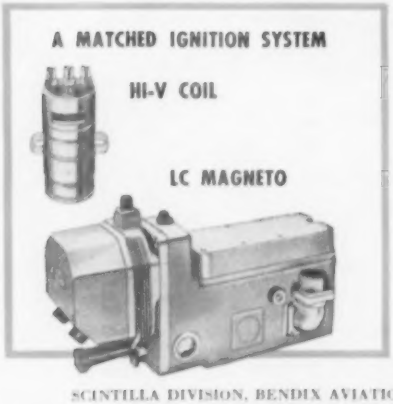
The Canadian Kellogg Company, Limited, Toronto • Kellogg International Corporation, London

SUBSIDIARIES OF PULLMAN INCORPORATED

Look at All You Get in the New Bendix LC IGNITION!

1. Long service life
2. Simplified maintenance
3. Longer spark plug life
4. No unscheduled ignition shutdowns
5. Positive spark timing
6. High voltage output
7. Matched ignition system
8. Single or dual ignition
9. Flame proof
10. Low maintenance costs
11. For engines of 6 through 16 cylinders

Designed Specifically for the Petroleum Industry



Just check these outstanding exclusive features and you will know why the Bendix* LC Magneto has been engineered to meet the exacting requirements of the modern high-compression gas engines used so widely throughout the petroleum industry.

As the Bendix LC is a completely new type of magneto, it incorporates the latest development in material, engineering, design and production techniques. The result is a matched ignition system—LC Magneto plus Bendix Hi-V Transformer coils—that delivers more than ample voltage with greatly reduced maintenance costs.

For engines of 6 to 16 cylinders where top performance is a must, the new Bendix LC Magneto is the logical choice.

Complete descriptive folder is available on request.

*TRADE MARK

SCINTILLA DIVISION, BENDIX AVIATION CORP., SIDNEY, N. Y.
Export Sales and Service:
Bendix International Division, 205 East 42nd St., New York 17, N. Y.
FACTORY BRANCH OFFICES: 117 E. Providencia Avenue, Burbank, California • 512 West Avenue, Jenkintown, Pennsylvania • Stephenson Building, 6560 Cass Avenue, Detroit 2, Michigan • 5906 North Port Washington Road, Milwaukee 17, Wisconsin • American Building, 4 S. Main St., Dayton 2, Ohio • 8401 Cedar Springs Road, Dallas 19, Texas Boeing Field, Seattle 8, Washington • 1701 "K" Street, N. W., Washington 6, D. C.

Bendix
SCINTILLA DIVISION

Bendix
AVIATION CORPORATION

HOW TO GET THE BEST RESULTS FROM ANY TRAPPING JOB...

DRAINING CONDENSATE FROM STEAM

How to correctly size, install and maintain steam traps for any pressure, any temperature, any load... Armstrong inverted bucket trap design principles and advantages... sizes, list prices, physical data, capacities... data on variable loads, warming-up loads, submerged coil heat transfer, steam main and riser drainage... trapping of unit heaters... power plant trapping, and many other subjects. ASK FOR 44-PAGE CATALOG J, The Armstrong Steam Trap Book.

DRAINING LIQUIDS FROM AIR AND GAS

How to select and install ball float traps for draining light liquids or water from drip points, aftercoolers, separators, etc., in compressed gas and air systems... liquid level control hookups... high pressure trapping to 1000 psig... trap materials for corrosive service... capacities, physical data, list prices, single lever, compound lever and "snap-action" traps. ASK FOR BULLETIN 289.

VENTING AIR AND GAS FROM LIQUIDS

Selection and installation of ball float traps for venting air and gas from water and light liquids under pressure... contains useful table on air discharge through various size orifices at pressures from 1 to 1000 lbs.... when and how to back vent traps... floats and mechanisms for other manufacturer's devices... sizes, list prices, materials, dimensional data for Armstrong Ball Float AR Traps. ASK FOR BULLETIN 450.

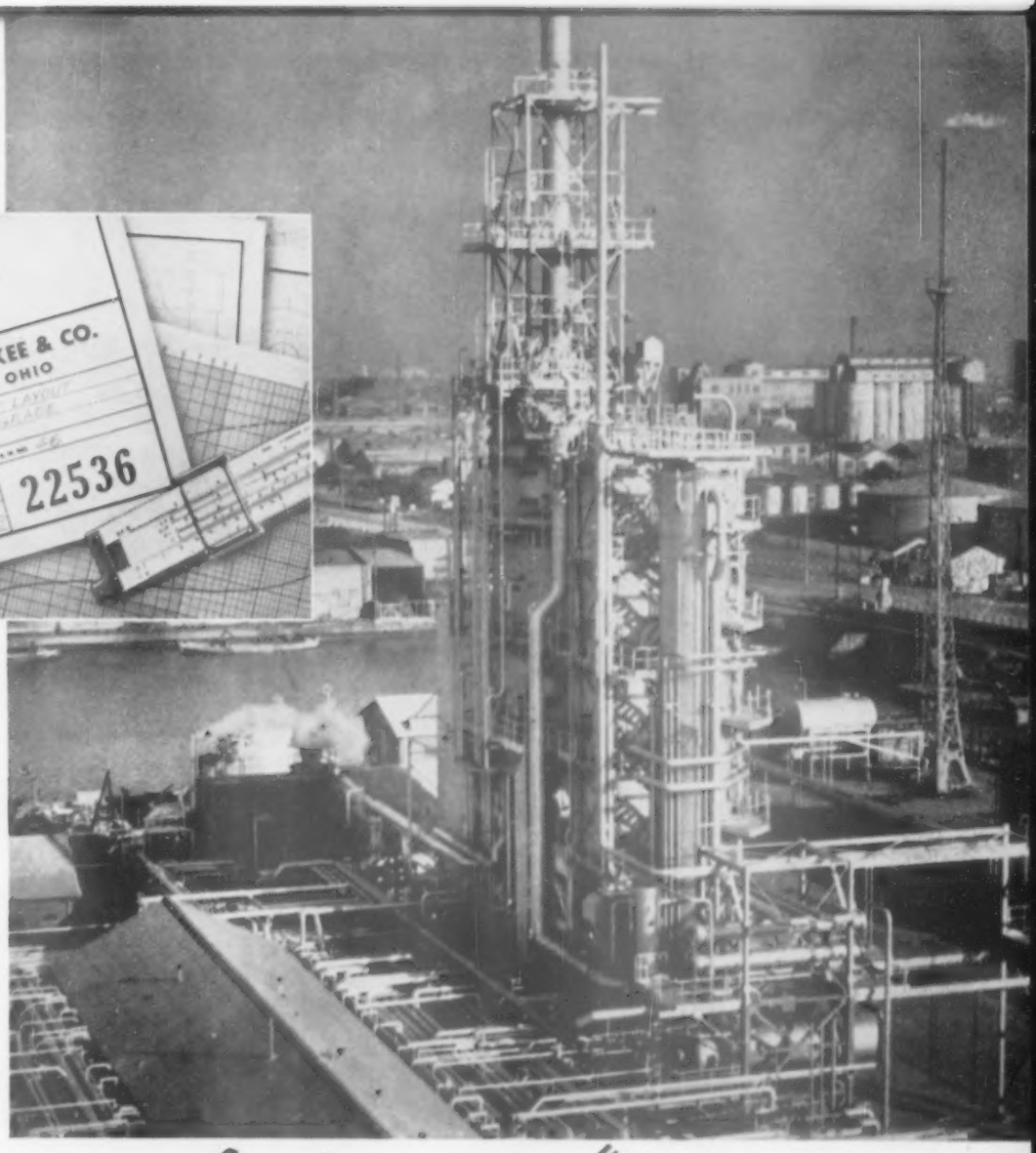
DRAINING WATER FROM LIGHT LIQUIDS

Dual gravity trap selection and installation explained and diagramed... for draining gasoline separators, dehydrator tanks, debutanizers, etc.... orifice capacity data, dimensions, materials, list prices for Armstrong Ball Float D/G Traps. ASK FOR BULLETIN 2091.

Free on request without obligation—call your local Armstrong Representative, or write Armstrong Machine Works, 868 Maple Street, Three Rivers, Michigan

ARMSTRONG

INVERTED BUCKET and BALL FLOAT TRAPS FOR THE PETROLEUM INDUSTRY



HERE'S WHY McKEE

"builds your plant on paper"

before we build it on the site . . .

● A half-century of experience has shown us (and our hundreds of customers) the value of thorough, painstaking engineering of projects like yours. We know that meticulous care and accurate thinking-through of every detail of design and engineering pays off for you in dollars and cents.

Good engineering drawings speed up construction, save man-hours in the field and avoid changes during construction. But, most important of all, this superior brand of engineering by McKee gives you what you want for your money — a better plant, designed and built to earn a profit.

50th ANNIVERSARY

McKee Engineering Services

Arthur G. McKee & Company • Engineers and Contractors
Headquarters: McKee Building • 2300 Chester Avenue • Cleveland 1, Ohio
Offices: New York, N.Y. • Union, New Jersey • Washington, D. C.
British Representatives of Metals Division: Head, Wrightson & Co., Limited
Canada: Arthur G. McKee & Company of Canada, Ltd., 372 Bay St., Toronto

Modern Truck Features That Mean Business!

Chevrolet trucks have got it! A full list of modern features that mean better business—on the job today and at trade-in time tomorrow!

When you get right down to it, any truck without all of Chevrolet's Task-Force features is still living in the past. Why risk losing money with an old-fashioned truck—both on the job and at trade-in time—when you can get a Task-Force model with the industry's most advanced features?

Most modern power—V8 or 6. There's longer life in Chevrolet V8's (extra cost in most models). With their short-stroke design—shortest of any leading truck—you can count on less friction and wear per mile. If you go for sixes—Chevrolet's gas-saving valve-in-head sixes are famous for their dependability. All engines are sparked by a modern 12-volt electrical system for quicker starting and smoother going!

Most modern comfort and safety features. New efficiency boosting advances like panoramic windshield, High-Level ventilation, softer seat action and concealed Safety Steps!

Most modern chassis features. New suspensions; new, more rigid frames; Power Brakes standard on 2-ton models!

See your Chevrolet dealer for details. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

NEW CHEVROLET

CHEVROLET *Task-Force* TRUCKS

"Unto you is born a Savior which is Christ the Lord"

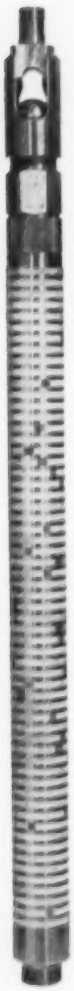
Window by Charles J. Connick Associates (Boston) in St. Paul's Episcopal Church, Salt Lake City. Copies for framing on request.

Jones & Laughlin
STEEL CORPORATION

SUPPLY DIVISION • TULSA

The Facts behind
the Success of the

MARTIN PLUNGER



There's an old saying which tells us that, "Nothing succeeds like success." And it's true. You see examples of it every day. But in the case of the Martin Plunger success has two distinct elements — the manufacturer's success in designing a functionally superior mechanical device, and the producer's success in overcoming sand and salt water conditions with the installation of Martin Plungers.

Take a water condition, for instance. Water is a lubricant for rubber. And since the Martin Plunger uses numerous split rubber-and-duck rings, the water content of the well actually serves as an efficient lubricant for the Martin Plunger. Where other plungers fail, the Martin Plunger goes on producing month after month.

In sand, these numerous split rubber and duck rings, held in individually machined grooves, form a sand resistant seal without a tight, wearing fit in the working barrel. Rubber-and-duck rings withstand sand abrasion better than any metal or hard material. Actually, the Martin Plunger produces a buffing and polishing action — won't score or scratch the working barrel.

Martin Plungers are designed for all rod pumps and tubing pumps . . . all sizes and lengths . . . for any depth. A wide range of ring sizes gives you any desired working fit. Write for the new John Martin Catalog No. 4, with helpful information on how to select the correct plunger for your particular installation and conditions.

Martin Plungers are available through all supply houses.

JOHN N. MARTIN
Manufacturer
9 W. BRADY • TULSA, OKLA.

GASO distributors join with the makers of Gaso Pumps in wishing you the happiest of Christmases this year . . . We have so much to be happy about. Except for minor disturbances, the world is at peace.

There is work for all who wish it, with earnings that assure an abundance of the good things of life for more and more of our people . . .

It's a wonderful era to be born in and a wonderful land to live in . . .

May you and yours find the full measure of its enjoyment during the holiday season and throughout the New Year beyond.

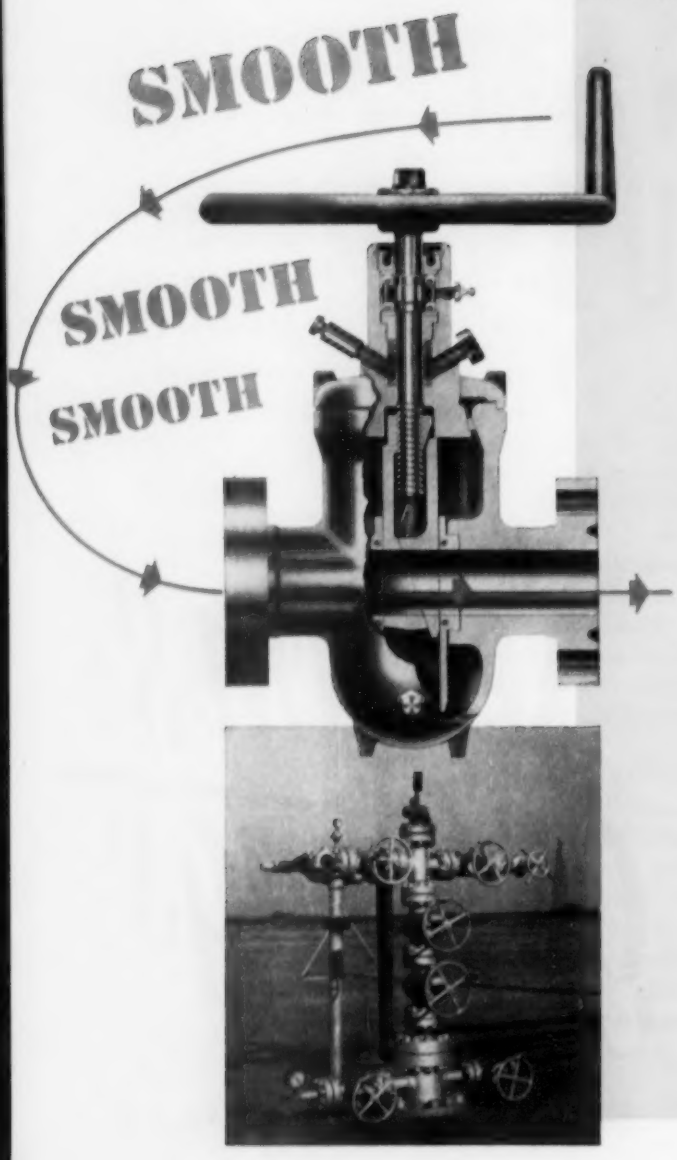
Seasons Greetings

GASO PUMP & BURNER MFG. CO.
TULSA, OKLAHOMA

GASO PUMPS
for every oil industry need

Best Choice...

...for NOW and the FUTURE



W-K-M Valves

The fluid flow through a W-K-M-Valve approaches true laminar flow even more closely than the flow through a smooth wall pipe. There is no place for sediment to collect.

The complete story of this quality valve includes also the following features:

- **PARALLEL EXPANDING GATE**
  ... seals on both sides by expansion, not by wedging or jamming.
- **OVERSIZE, RENEWABLE SEATS**
  ... not exposed in either open or closed position.
- **LUBRICATION**
  ... for all moving parts from supply in the body where it prevents internal corrosion.
- **PRESSURE SEAL BONNET**
  ... uses no studs and nuts — self-adjusts to temperature changes — seals tighter as pressure increases.
- **METAL-TO-METAL SEALS THROUGHOUT**
  ... no "O" rings, rubber, fiber or synthetic materials.

W-K-M Valves

W-K-M Manufacturing Company, Inc.
A subsidiary of ACF Industries Incorporated
P. O. Box 2117, Houston 1, Texas Los Angeles, California
Export Office: 45 Rockefeller Plaza, New York, N. Y.

AVAILABLE JOHNSTON by AL CAPP

STOP!!-AN' WHISPER TH' WORDS AH IS DYIN' T' HEAR!!
YO' MEAN THEM THRILLIN' WORDS 'BOUT HOW WE JOHNSTONS DO TH' FINEST TESTIN' JOB, BECUZ O' TH' HYDRAULIC TESTER, THAT PREVENTS SHOCK T' FOR-MAY-SHUN, PIPE, AN' INSTRUMENTS!!
NO!!-THOSE EVEN MORE THRILLIN' WORDS, 'BOUT--
'BOUT HOW TH' HYDRAULIC TESTER GIVES YO' POSITIVE OPER-AYSHUN EV'RY TIME?-
pSST!!-AH THINKS SHE MEANS---
OH!!-NATCHERLY!!- MERRY CHRISMUS T' YO'!!
-AN' YO'!!
-AN' YO'!!
Cal Capp

C-549

Copr. Capp Enterprises 1954

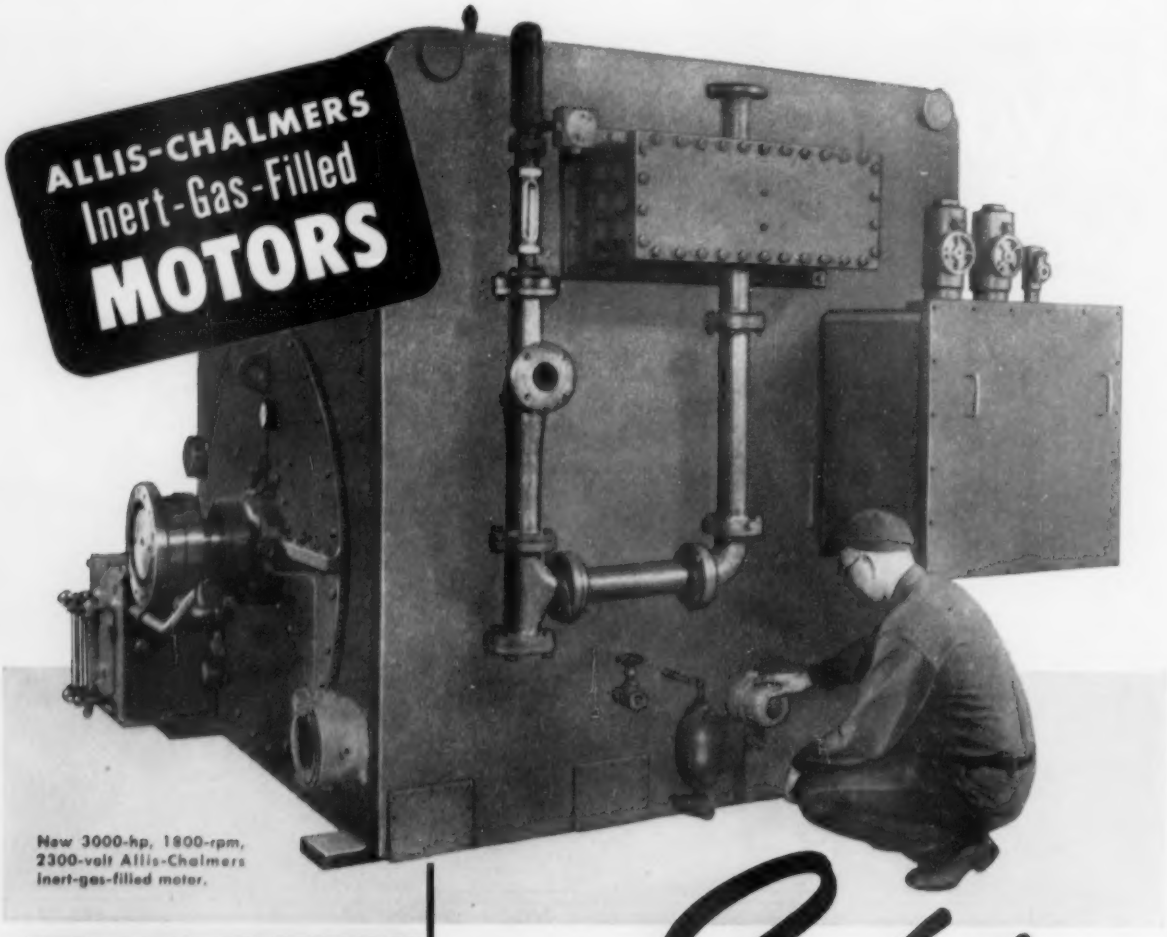
JOHNSTON TESTERS

first in drill stem testing

HOUSTON, TEXAS

LOS ANGELES, CALIF. • CALGARY, CAN

FORMATION AND CASING TESTING — JOHNSTON



New 3000-hp, 1800-rpm, 2300-volt Allis-Chalmers inert-gas-filled motor.

For Hazardous Areas

Get *Safety* with Economy!

These motors have been found ideal for driving high speed compressors in refineries. An inert-gas atmosphere is maintained inside the enclosure of the motor. The non-explosive gas is held under positive pressure and keeps out volatile surrounding gases that could cause an explosion.

Air-to-water surface heat exchangers remove heat of motor losses. Special oil seals on shaft extension prevent gas leakage outward along the shaft.

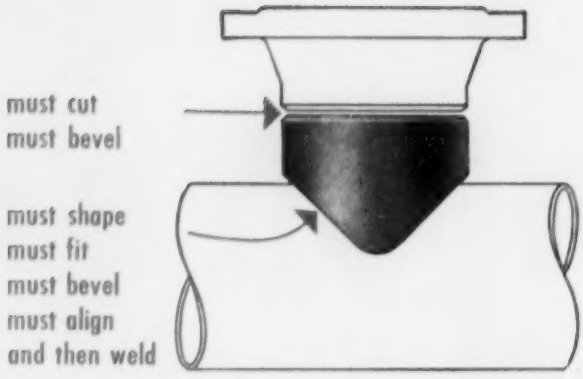
These motors are available in a wide range of ratings in larger sizes. Ask the A-C office in your district, or write to Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

A-C ALLIS-CHALMERS

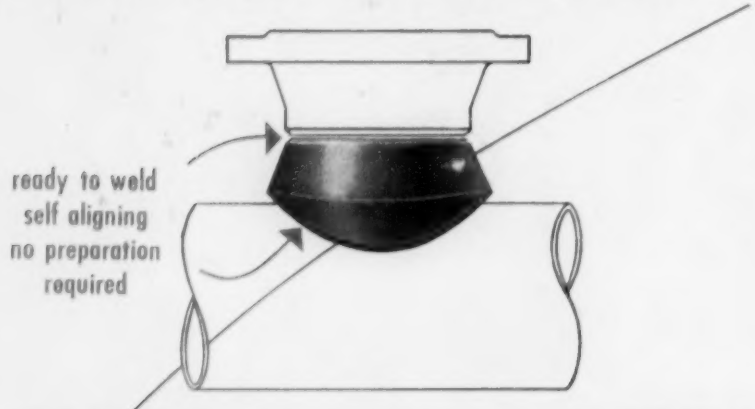
ALLIS-CHALMERS

A-4825

Wilson
Wilson



short nozzles DON'T PAY...



BONNEY WELDOLETS DO!

Even on low pressure piping . . . avoid non-productive preparation time . . . SPECIFY and USE WELDOLETS

No joint preparation is required for *either* weld of the Weldolet, whereas considerable preparation is required for *both* welds of the miter branch construction.

The integral reinforcement of the Weldolet Welding Fitting has established it as an ideal method of constructing branch connections on high pressure and/or high temperature piping. This feature is *bonus insurance* on low pressure piping where the Weldolet is easier and more economical to use than preparing the two ends of a short unreinforced nozzle.

Sold through leading Distributors in Principal Cities

BONNEY

WELDING FITTINGS DIVISION

FORGE & TOOL WORKS

366 GREEN ST., ALLENTOWN, PENNA.

They Say—

Who Will Be Leaders?

"The liberal arts are on the threshold of their most useful period of expression, for our need today is for education in the broader sense. Society demands that universities supply not only the technical experts but those with a potential for broad leadership.

"With our highly complex society of today, more specilization is needed. Yet the greater degree of specialization we achieve, the greater the need for a perspective that can balance and equate the diverse elements in terms of the broader purpose.

"The technical student must recognize and understand the social forces just as he must understand the stresses of physical phenomena, otherwise his capacity for leadership will be severely limited.

"At the same time, the liberal arts courses must include a thorough analysis of the impact and the meaning of technology . . . Failure to understand the nature of technology is the basis of many of our present national and international tensions.

"The role of leadership in tomorrow's world will be assumed neither by those who know a great deal about a very little or a very little about a great deal. It will be discharged only by those whose thinking is broad and uninhibited, those with grasp and understanding."

Henry du Pont, vice president of the Du Pont Co., in address before 24th annual conference of Academic Deans of Southern Colleges, Miami, Fla.

More Pay Might Help

Dear Sir:

The recent articles in The Oil and Gas Journal and other publications analyzing the so-called shortage of technically trained personnel in the United States seem to overlook one of the most important "flies in the ointment" as well as several other "bugs."

In the first place, since our country operates roughly within a supply and demand framework, which in a free enterprise is directly related to money, wouldn't it seem logical that the relatively small percentage of young people interested in the sciences is largely due to insufficient reward as regards pay, work conditions, advancement, recognition, and constructive, challenging engineering effort (rather than red tape)?

The various devious explanations of the problem that I have seen are con-

LP Gas . . . and Beacon Petroleum Company

It wasn't too long ago that gas was flared at the well site. Today this gas has become an important source of revenue for oil producers. With an experienced and aggressive staff, Beacon Petroleum offers producers a service they find impossible to duplicate.

If you have any petroleum products to sell, contact Beacon . . . or if you want to buy petroleum products contact Beacon . . . we have the facilities and know-how to fulfill your every need.

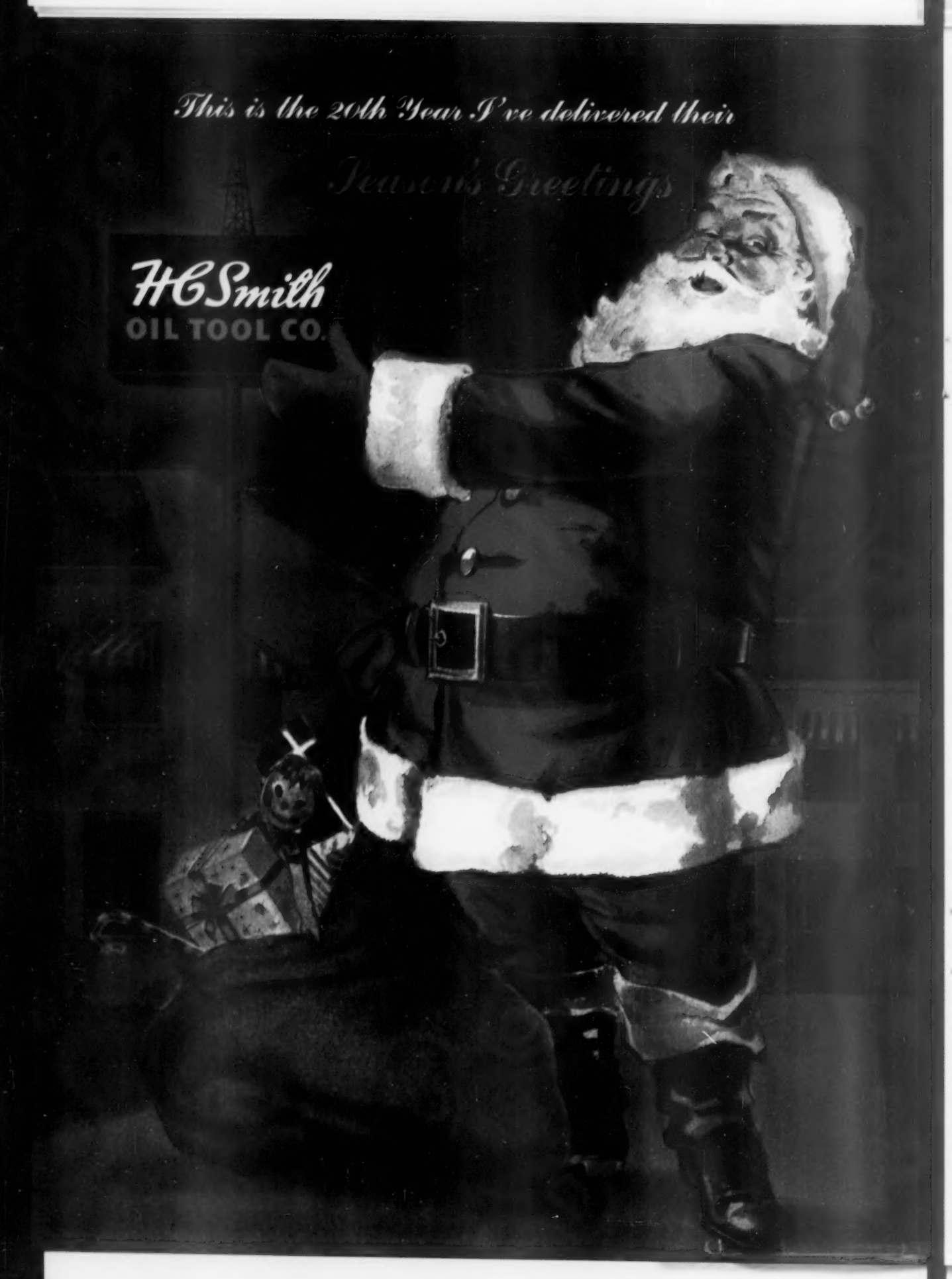
BEACONGAS

BEACON

PETROLEUM COMPANY

TULSA • HOUSTON

MARKETERS OF NATURAL GASOLINE, BUTANE-PROPANE, MOTOR FUEL, FUEL OILS


This is the 20th Year I've delivered their
Season's Greetings
H C Smith
OIL TOOL CO.

tributory, of course, but the heart of the matter (as with school teachers) is inadequate reward compared to competing fields.

If there is a present, serious shortage of engineers, industry is not worried enough about it to strike the two main telling blows, i.e. (1) raise the ante sufficiently, and (2) turn loose the existing engineering talent rather than tying it down among procedural red tape and insignificant problems. Possibly the actual worry is one of future shortages which are beginning to pinch but not enough to result in positive action rather than academic double talk.

A Petroleum Engineer
Lake Charles, La.

(I prefer that my name not be used due to possible reflection on my employer.)

Any Oil in Idaho?

Dear Sir:

I've noted with interest your statement in the October 17 issue that only 18 states do not produce oil among them, Idaho.

My good friend, Clarence E. Moore, Plymouth Stamping Co., tells me that Lewiston, Idaho, had a few producing oil wells when he was there in July, 1924.

Evidently, these wells have been abandoned and forgotten with no additional discoveries.

Frank I. Webster
1113 Forestdale
Royal Oak, Mich.

Editor's Note: Oil in commercial quantities has never been found in Idaho, according to best historical authorities. It is true that 40 wells were drilled in the state between 1905-28. Some few had good showings of gas and oil, but none proved commercial.

No Monopoly Here

"Gas production is a highly competitive enterprise. There are more than 8,000 producers competing to find, produce and sell natural gas—without benefit of franchises or exclusive markets. No single company produces as much as 5 per cent of the gas used in this country. The 37 largest companies produce less than half the total.

"There is greater concentration of output in 382 of the nation's 452 manufacturing industries and in nearly all extractive industries than there is in natural gas production.

"Moreover, natural gas competes with coal, oil, and liquefied petroleum gas, also competitive industries, for the consumer's dollar. It follows that if federal regulation of natural-gas producers is to be sustained on the basis

"So I says, 'If it's a Christmas Tree... I'll decorate it...'"

The naive young man may not know a Christmas tree from a Christmas tree . . . but here's something you can bet on: veteran Joe Roughneck, symbolic figure of the fabulous oil industry, knows everything about everything concerned with drilling for and producing oil . . . including pipe.

Whether Joe is rendering rugged service on a rig . . or whether he's the brain of a big company . . he knows the kind of quality pipe it takes. More, he knows Lone Star makes it . . and will deliver it on the double! Depend on Lone Star API casing, tubing, and line pipe.

Neighbor, wherever you are,
MERRY CHRISTMAS!

Lone Star STEEL COMPANY

LSS

EXECUTIVE-SALES OFFICES
W. Mockingbird Lane at Roper • P. O. Box 8087 • Dallas, Texas

DISTRICT SALES OFFICES
Houston, Texas | Midland, Texas | San Antonio, Texas
Tulsa, Oklahoma | Wichita Falls, Texas | Shreveport, La.

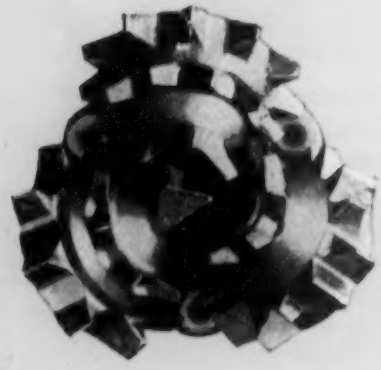
PERFORMANCE IN THE FIELD...

IS THE PERFORMANCE THAT **PAYS OFF!**

The true value of ANY drilling bit is determined *only* by performance in actual drilling service. That is why Globe places such great emphasis on field testing to prove the digging qualities of Globe Bits in the oil fields instead of merely estimating them in the laboratory.

Proof that Globe Performance "Pays Off" is constantly reflected by the increased use of Globe bits throughout the world . . . 24% more Globe Bits were used in the first six months of 1955 than in the corresponding period of 1954.

GLOBE
2 and 3 Cutter Rock Bits, Regular and Jet Type Offer Operators Everywhere, a New Standard in Oil Well Drilling



Globe "SS3C" Jet Rock Bit

Globe "SS2C" Jet Rock Bit

GLOBE
OIL TOOLS COMPANY
GLOBE OIL TOOLS

LOS NIETOS, CALIFORNIA
Branches in All Principal Drilling Areas

of monopoly or concentration of control, four-fifths of the manufacturing industries and all of the extractive industries in this country should for the same reason be regulated as public utilities. That would be the end of free competitive enterprise."

George Popp, Phillips Petroleum Co., in address before Hudson, Ohio, Rotary Club.

Octanes Expensive

"An increase of one octane number costs the refiner about two million dollars in plant investment for a refinery processing 100,000 bbl. per day of crude."

Howard G. Vesper, vice president, Standard Oil Co. of California, in address before American Petroleum Institute Division of Marketing, San Francisco.

CALENDAR OF EVENTS

1956

JANUARY

9-13 Society of Automotive Engineers, annual meeting, Sheraton-Cadillac and Statler Hotels, Detroit, Mich.

16-18 Pipe Line Contractors Association eighth annual convention, Boca Raton Hotel and Club, Boca Raton, Fla.

25-26 Northwest Petroleum Association, annual convention, Nicollete Hotel, Minneapolis.

25-27 Eleventh annual Symposium on Instrumentation for the Process Industries, Memorial Student Center, A. & M. College of Texas, College Station, Tex.

26-27 Fifth Annual Instrument Short Course, Los Angeles Harbor Junior College, Wilmington, Calif.

FEBRUARY

15-17 National Association of Corrosion Engineers Short Course for Pipeliners, Mayo Hotel, Tulsa.

19-23 American Institute of Mining and Metallurgical Engineers, annual meeting, Hotel Statler, New York City.

24 Natural Gasoline Association of America, Permian Basin meeting, Lincoln Hotel, Odessa, Tex.

26-29 American Institute of Chemical Engineers, Statler Hotel, Los Angeles.

27-29 American Association of Petroleum Geologists, Rocky Mountain Section, Auditorium, Denver.

MARCH

1-2 Southern Gas Association, transmission management conference, Jung Hotel, New Orleans.

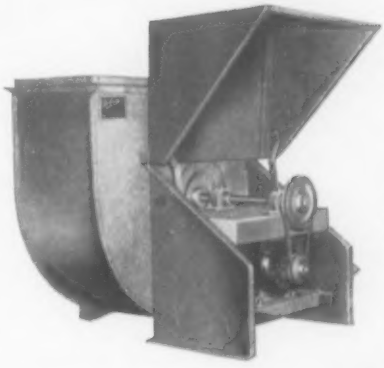
7-9 American Petroleum Institute, Division of Production, Southern District meeting, Plaza Hotel, San Antonio, Tex.

12-16 National Association of Corrosion Engineers, annual convention, Statler Hotel, New York City.

19-21 Western Petroleum Refiners Association, annual meeting, Plaza Hotel, San Antonio, Tex.

21-23 American Petroleum Institute, Divi-

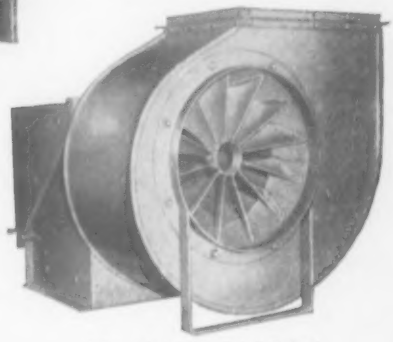
Get your air delivered at low cost in the handiest "packages" of all!



"Buffalo"

BELTED VENT SETS

Drive side of "Buffalo" Belted Vent Set furnished with hinged drive cover.



Indoor or outdoor installation! Available with this handy hinged all-weather drive cover and guard!

Adjustable capacity and no danger of overloading motor! Can be changed any time by adjusting sheaves — note adjustable motor bracket.

Convenient mounting flange plus lightweight, "package" design means economical installation for permanent or temporary use.

Inlet side of "Buffalo" Belted Vent Set showing inlet vanes.

VERSATILE! In 500 to 20,000 cfm capacities for small jobs where a quiet fan is desirable. Or for big jobs with a number of zones to ventilate, multiple-fan installations provide flexibility and economy over the large fan. Available in special construction such as access door in housing, non-ferrous everdur or aluminum wheel, explosion-proof motor, special protective coatings, high-temperature models for small induced draft service.

EFFICIENT, QUIET, STABLE PERFORMANCE is assured by "Buffalo" Inlet Vanes which minimize noise and turbulence—also by "Buffalo" backward curved blades and properly shaped housing scroll. In short, you enjoy the famous "Q" Factor of performance—the built-in Quality which provides trouble-free satisfaction and long life.

WRITE TODAY FOR BULLETIN 3702A for all details on these versatile packages!

"Buffalo"

BUFFALO FORGE COMPANY

525 BROADWAY BUFFALO, N.Y.

Publishers of "Fan Engineering" Handbook

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

Sales Representatives in all Principal Cities

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING
FORCED DRAFT COOLING HEATING PRESSURE BLOWING

Your men will travel **light**...and **fast** installing KRALASTIC® pipe for gas

How fast? *One major west coast home development company recently installed 4200 feet of 2" Kralastic pipe in just one week—with a crew of only two men!* They completed *50* home services from a steel main in the time usually required for just *10* services with standard pipe!

With Kralastic pipe, one man easily carries all that's necessary for the average home service—pipe, fittings, saw blade, solvent, and brush.

No particular skills needed, either. Often he can snake Kralastic pipe through existing lines, eliminating costly, time-consuming ditching. And he *solvent welds* Kralastic fittings in seconds.

No rust or rot! Kralastic pipe is impervious to electrolytic action and destructive soil chemicals. It retains its high impact strength over a wide range of temperatures.

More? The installed cost of Kralastic pipe is *far less* than other types of pipe. And Kralastic pipe will last *far longer!*

See how you can save with this tough plastic pipe that has proved its unmatched advantages for natural gas, water, brine, oil, and many other applications. *Write us today.*

Naugatuck Chemical

Division of United States Rubber Company
Naugatuck, Connecticut

US RUBBER

BRANCHES: Akron • Boston • Charlotte • Chicago • Los Angeles • Memphis • New York • Philadelphia • IN CANADA: Naugatuck Chemicals, Elmira, Ontario
Rubber Chemicals • Synthetic Rubber • Plastics • Agricultural Chemicals • Reclaimed Rubber • Latices • Cable Address: Rubexport, N. Y.

sion of Production, Southwestern District meeting, Texas Hotel, Fort Worth.

APRIL

3-5 Annual Corrosion Control short Course, University of Oklahoma Extension Study Center, Norman, Okla.

4-6 American Petroleum Institute, Division of Production, Mid-Continent District meeting, Broadview Hotel, Wichita, Kans.

9-10 Texas Petroleum Research Committee, Ninth Oil Recovery Conference (Symposium on Natural Gas in Texas), Texas A. & M. College, College Station, Tex.

11-13 Natural Gasoline Association of America, Texas Hotel, Fort Worth.

14-15 Southern Gas Association, conference on use of electronic computers by engineering personnel, Hilton Hotel, El Paso.

14-18 Petroleum Equipment Suppliers Association, annual meeting, Boca Raton Hotel & Club, Boca Raton, Fla.

15-17 Texas Independent Producers and Royalty Owners Association, Statler Hilton Hotel, Dallas.

17-19 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, Okla.

18-20 American Petroleum Institute, Division of Production, Rocky Mountain District meeting, Cosmopolitan Hotel, Denver.

18-20 National Petroleum Association, semiannual meeting, Cleveland Hotel, Cleveland, Ohio.

19-21 Gas Appliances Manufacturers Association, annual meeting, The Greenbriar Hotel, White Sulphur Springs, W. Va.

23-25 Southern Gas Association convention, Dallas.

23-26 American Association of Petroleum Geologists and Society of Economic Paleontologists, annual meeting, Conrad Hilton Hotel, Chicago.

25-27 American Petroleum Institute, Division of Production, Eastern District meeting, Deshler-Hilton Hotel, Columbus, Ohio.

25-29 World Oil Exposition, Houston.

30

May 1 Independent Petroleum Association of America, semiannual meeting, Statler Hotel, Los Angeles.

30

May 4 American Petroleum Institute, Safety and Fire Prevention midyear meeting, Warwick Hotel, Philadelphia.

MAY

6-9 American Institute of Chemical Engineers, Roosevelt Hotel, New Orleans.

10-11 American Petroleum Institute, Division of Production, Pacific Coast district meeting, Statler Hotel, Los Angeles.

10-11 American Gas Association, Gas Supply, Transmission, and Storage Conference, Conrad Hilton Hotel, Chicago.

14-17 American Petroleum Institute, Division of Refining, midyear meeting, Montreal.

16-18 American Gas Association, Chemical, Engineering, and Manufactured Gas Production Conference, Benjamin Franklin Hotel, Philadelphia.

24-25 Natural Gas and Petroleum Association of Canada, Sheraton Brock Hotel, Niagara Falls, Ont.

JUNE

17-22 American Society for Testing Materials, annual meeting, Chalfonte-Haddon Atlantic City, N. J.

24-25 Canadian Gas Association, Manoir Richelieu, Murray Bay, Que.

Perfection

Your SUPPLY STORE IS OUR DISTRIBUTOR

W.C. NORRIS MANUFACTURER, INC.

TULSA, OKLAHOMA

BRANCHES:
GREAT BEND, KANSAS; CORPUS CHRISTI, HOUSTON, KILGORE, ODESSA, WICHITA FALLS, TEXAS;
OKLAHOMA CITY, OKLAHOMA
SALEM, ILLINOIS; CASPER, WYOMING;
EXPORT: 30 ROCKEFELLER PLAZA, NEW YORK CITY

Since NORRIS 1882

WEST COAST DIST. REPUBLIC SUPPLY CO. OF CALIF., LOS ANGELES

The OIL AND GAS JOURNAL

TULSA, OKLAHOMA

Published every Monday by The Petroleum Publishing Co., 211 South Cheyenne Avenue, Tulsa, Okla. Phone Diamond 3-6291. Founded in 1902. Name changed to The Oil and Gas Journal in 1910 by Patrick C. Boyle.

•

P. C. LAUINGER
President

S. H. ROURKE
Executive Vice President

MITCHELL TUCKER
Vice President and Advertising Manager

HANSON B. PIGMAN
Circulation Manager

DONALD W. WILSON
Manager Industry Census Department

J. PARKER HOLLAND
Production Manager

ADVERTISING OFFICES

TULSA
211 South Cheyenne, Diamond 3-6291
JOHN D. REILLY — Mid-Continent Manager
HARRY B. BULLEN — Representative
D. B. MILLER — Classified Adv. Mgr.

NEW YORK
500 Fifth Avenue, LOngacre 4-6160
CHARLES A. WARDLEY — Eastern Manager
JAMES W. BROWNLEE — Representative
JOHN W. MEANY, JR. — Representative

CHICAGO
105 West Madison Street, CEntral 6-2537
E. S. KLAPPENBACH — Midwestern Manager
DAVID T. KENNEY — Representative
JOHN D. YODER — Representative

PITTSBURGH
106 Nelbon Avenue, FRemont 1-7775
ALFRED M. JONES — Manager

HOUSTON
Sterling Building, CA 4-7726
JOHN M. SPEARS — Gulf Coast Manager

DALLAS
1238 Mercantile Bank Building, STerling 3074
GEORGE O. RUPPERT — Representative

LOS ANGELES
650 South Grand Avenue, VAndike 0722
DONALD O. HANSON — Manager

ENGLAND
National Provincial Bank Chambers,
15 Grafton Street, Altrincham
Phone Altrincham 3160
HARRY BECKER — European Representative

•

Subscription rates to the petroleum industry, United States and foreign, 1 year, $4.00; 2 years, $7.00; 3 years, $8.00. Single copies: regular issues 50 cents; special issues $1.00. Back copies when over a year old, $1.00. Note: Payments from outside the U.S.A. may be made by international money order, New York Exchange, or check on a U.S.A. bank. Entered as second-class mail matter at Tulsa, Okla., under Act of March 3, 1879. Copyright 1955 by The Petroleum Publishing Co.

Member
Audit Bureau of Circulations
Associated Business Papers

JOURNALLY SPEAKING . . .

It's Expected This Time of Year Anyway

THE idea that business papers should run editorials and articles that are highly seasonal
Always seemed to us not entirely reasonal.

Because business papers are devoted to material that will help their readers make money
And are not looked to for literary gems that are light or sentimental or even slightly funny.

For instance, nobody expects The Oil and Gas Journal to run articles about home and family living.
So why should we write editorials about Fourth of July or Easter or Christmas or Thanksgiving?

Oil men are supposed to be so wrapped up in details of their operations
That they have no time for celebrations;
They are more interested in depletion laws
Than Santa Claus.

According to this concept, an oil man would not enjoy a festive occasion
Because he is so worried about taxes and imports and dry holes and the effects of proration;
And that the Christmas spirit is not endowable
On a guy constantly worried for fear he will get a cut in his allowable.

And how can a man join wholeheartedly in singing Christmas carols
If his production is off by a considerable number of barrels?

A Christmas tree to him means only a bunch of valves hooking a flowing well to the line
And not a candle-festooned, gift-surrounded symbol of spruce or pine.

St. Nicholas he quite likely would be high hatting
If involved in the complexities of wildcatting,
And his interest in wreaths and reindeer and other traditional accouterments of the holiday would be doubtable
When wondering if his properties are payoutable.
When trying to find a market for his CONdensate (or is it conDENsate?),
On the Christmas spirit he would not be able to concentrate, or even to sense it.

But we have a notion that oil men do have some milk of humanness
In spite of the failure of Eisenhower to clean up the Truman mess,
And that to celebrate the holiday season they will feel free
Even though they are about to be ruined by FPC.

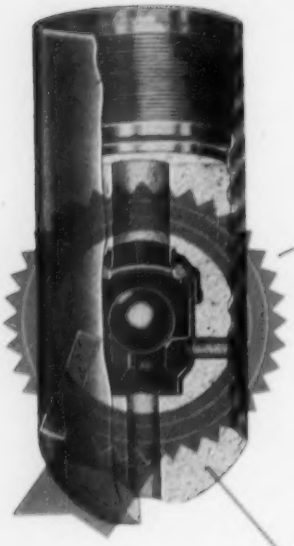
And even though on operating costs they are taking a beating,
They will appreciate the customary season's greeting.

So we take this opportunity to wish all oil men from the North Pole to the Isthmus:
MERRY CHRISTMAS.

—*Henry D. Ralph.*

Through the years...
today and for many tomorrows...

Seal of Perfection



THE *Seal of Perfection*

in Floating Equipment

THE BAKER
BALL-TYPE BACK-PRESSURE VALVE WITH RESILIENT SEAL

proved efficient and dependable in over 200,000 actual runs

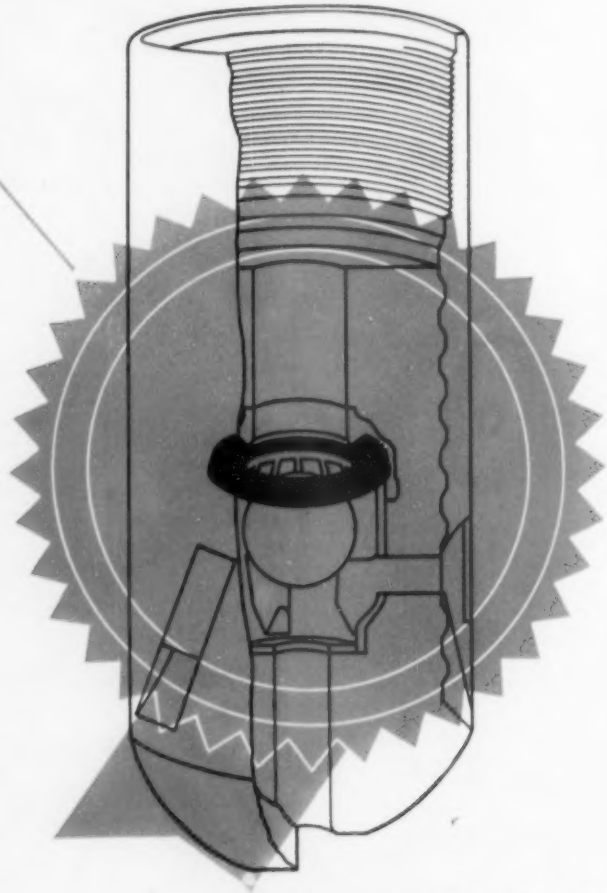
SIMPLE... POSITIVE
No tricks, no springs, nothing to warp or stick. The resilient valve seal is anchored in bakelite, protected from circulating fluids—and *does not move*. The Baker Bakelite Ball FLOATS, and seals instantly and positively against the resilient valve seal upon reversal of pressure when pumps are shut down.

COMPLETELY DRILLABLE
Baker Floating Equipment contains ABSOLUTELY NO METAL in the internal construction, and drills out so quickly and easily that you hardly know it is there. No springs, no aluminum—nothing except Bakelite and concrete which break up into small, harmless fragments and *circulate out of the hole*, leaving no dangerous metal to ball up and freeze the cutters on the bit or interfere with future operations.

MEETS EVERY NEED
Baker Floating Equipment containing the Seal of Perfection is available in many types of shoes and collars with any type of thread connection that might be required.

PROTECT YOUR INVESTMENT IN TIME AND EQUIPMENT AND RUN FLOATING EQUIPMENT THAT OFFERS PROOF OF PERFORMANCE AND DEPENDABILITY. THE PROVEN ADVANTAGES OF THE BAKER BALL-TYPE BACK-PRESSURE VALVE FEATURING THE SEAL OF PERFECTION CAN BE YOURS BY MERELY SPECIFYING BAKER FLOATING EQUIPMENT.

SERVICE AND STOCKS EVERYWHERE
Baker representatives are in every active area ready to advise and aid you in selecting the exact equipment for your job—and *your* supply store can fill your orders promptly.



BAKER OIL TOOLS, INC.
HOUSTON • LOS ANGELES • NEW YORK

Scotch this $800,000,000 lie

SENATOR Douglas of Illinois, and other self-appointed spokesmen for consumers, are giving wide publicity to the claim that gas consumers will be gouged by 400 or 600 or 800 million dollars a year if Congress passes the Harris bill.

The estimate is completely false, and its falsity can be demonstrated to anyone willing to look at a few figures. But this fantastic lie will be tossed around in headlines and in Senate debate during the next couple of months unless gas producers take vigorous steps to scotch it.

The basis of this lie is the computation that natural gas is worth 25 or 30 cents per M.c.f. at the wellhead on the basis of its heat content and the price of other fuels, whereas the average field price is around 10 cents. So it is assumed that field prices would jump at least 15 cents on passage of the Harris bill. Multiplying this by the volume of gas produced gives something like $800,000,000.

BUT HERE ARE THE FACTS: Total field prices of all gas moved interstate and sold to residential consumers have never exceeded $135,000,000 in any one year—even before the Phillips decision put producers under federal regulation. So if field prices should increase one-and-a-half times, approximately $200,000,000 a year would be passed on to some 20,000,000 residential gas consumers.

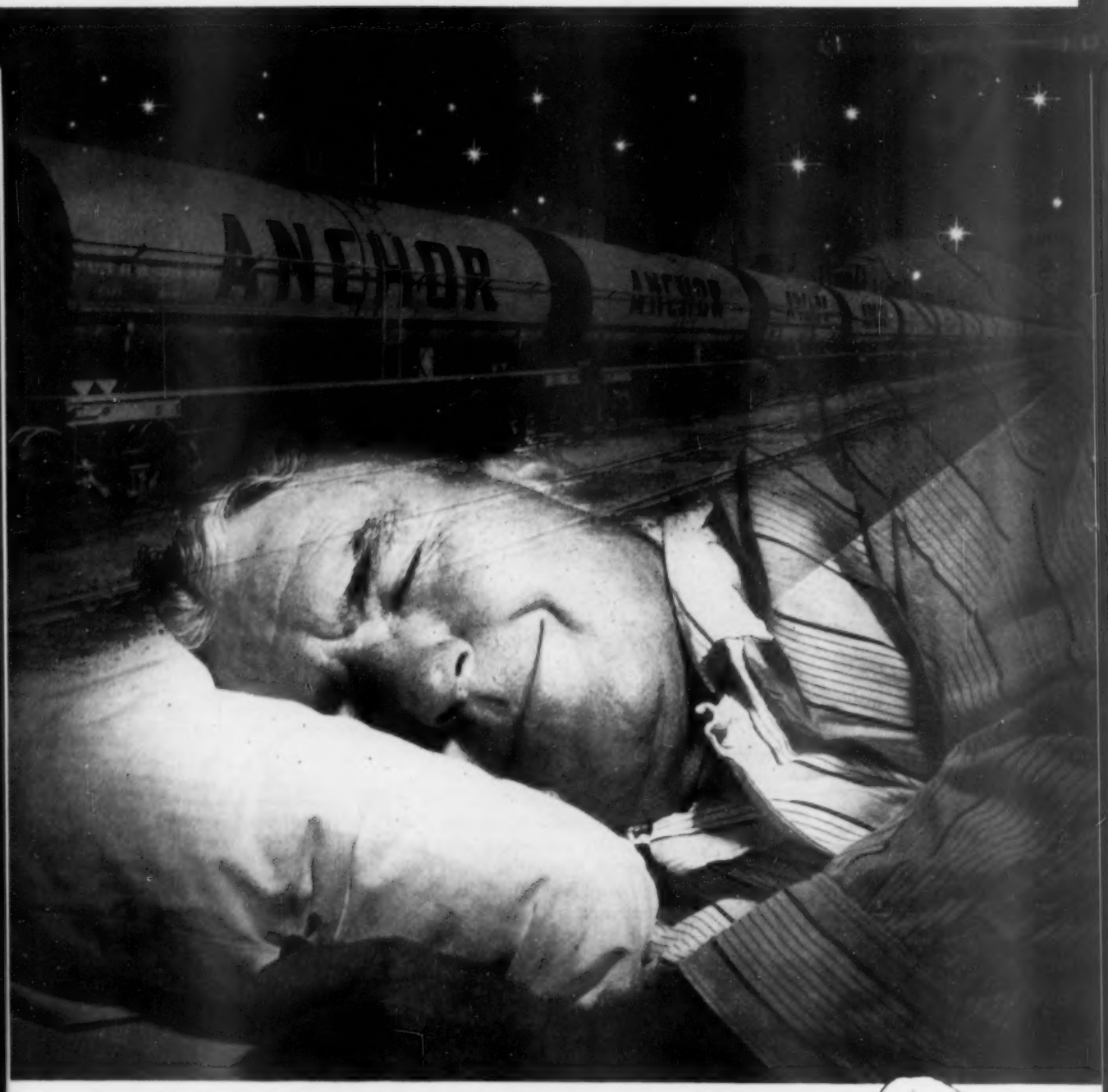
But of course field prices couldn't go up like that. Even in the complete absence of any regulation, long-term contracts and horse-sense economics would prevent it. The fact that you think your house is worth twice what you paid for it is no basis for asserting that all building prices are going to double tomorrow.

The escalation and favored-nation contracts which so alarm consumer spokesmen couldn't raise oil field prices to anywhere near 25 cents even if allowed to operate unchecked. And the Harris bill as passed by the House severely curbs such escalations and contains many other consumer safeguards against increased producer's prices.

THIS LIE ABOUT an "$800,000,000 consumer gouge" is just one of many exaggerations and fabrications about the gas business being used to catch headlines and inflame voters. They could defeat the Harris bill unless they are refuted and knocked out of circulation by the real facts.

It is even false to call the Harris bill a producers' bill anymore. Amendments have put in so many restrictions on field prices and so many consumer safeguards that in truth it is a consumers' bill.

Wouldn't it be ironical if legislation for the long-range benefit of gas consumers were defeated by falsehoods spread by those short-sighted persons who want nothing short of federal regulation of gas production on a public-utility basis?



Counting Profits Instead of...

ANCHOR
MARKETS FOR HIM

Many producers and refiners are getting better sleep these nights. They've let Anchor take over their marketing problems. Anchor is a specialist in marketing — knows the special problems involved and is efficient at dealing with them. Anchor can do a better job of marketing, do it more economically and with much less trouble than the average producer or refiner. Actually, when you market through Anchor, you find that you make more net profit due to reduced office expenses alone. So, if you would count profits instead of sheep, let Anchor take marketing off your hands. Anchor buys and sells: LPG, Natural Gasoline, Diesel Oil, Fuel Oil, Asphalt, Commercial Solvents and Other Petroleum Products. Call Anchor — Tulsa, CHerry 2-7261.

ANCHOR PETROLEUM CO. • TULSA

SALES OFFICES: Des Moines, Shreveport, Toledo, Houston, Long Beach, Okla. City, Midland, Texas, San Francisco, Fresno, Seattle, Salt Lake City, E. Patterson, N. J., Hattiesburg Miss., Macon, Ga., St. Paul, Minn.

Current and significant in . . .

The Industry This Week

Pipeline

• **A second big-inch gas line** is planned by two California utility companies.

Firms plan a 30-in. line from Topock, Ariz. to Newhall, Calif. Line would bring San Juan basin gas to Los Angeles, would cost more than $30,000,000. P. 56.

First section of a 28-in. gas line to serve Moscow has been completed. The line will extend 900 miles from Stavropol, in the Northern Caucasus, to Moscow. P. 62.

First pipe is laid for the 600-mile products line in Iran. Initial project was a river crossing. Line will connect the huge Abadan refinery with Teheran. P. 62.

Refining

• **Socony Mobil, Houdry settle 3-year-old patent dispute** out of court. Agreement permits both firms to continue to license disputed processes, but Socony will pay Houdry $12.50 per barrel for any new Thermofor cat-cracking capacity it builds. Socony also will pay $3,000,000 to acquire certain patent rights and settle patent claims. P. 54.

El Paso Natural is negotiating for another refinery. The company recently acquired McNutt's 3,200-bbl. plant, now is dickering for Malco's 2,500 bbl. refinery at Prewitt, N. M. P. 56.

Drilling

• **What's putting the kick** in Richardson & Bass' world's deepest well? The answer isn't known exactly yet.

Operators believe it's from a formation at the bottom of the well. Other possibilities: Swabbing action from pulling drill pipe and drill collars which sucked formation fluid into the hole. Or, the fluid could be strong salt-water flow.

By weekend, crews had "snubbed" 13,600 ft. of drill pipe back into the hole, were pumping 18.3-lb. mud into well, and circulating at 13,485 ft. against 1,200 psi. held on the blowout preventers. P. 48.

Production

• **Generous treatment of water-flood production** is facing a stiff test in Texas. Humble is asking the Railroad Commission to treat water-flood wells like other producers in setting allowables. It claims new wells are penalized by the present policy and that production from the water floods can be controlled like other wells. P. 50.

A second high-pressure gas-injection program is planned in Louisiana by Atlantic Refining Co. Spurred by success of its pioneer venture in West Texas, the company will try to increase oil recovery from the 10,400-ft. sand in Neale field of Beauregard Parish. P. 58.

Exploration

• **A gas-condensate field is indicated** in a little-explored area of the southern Mississippi coast. A Hancock County wildcat less than 5 miles from the Louisiana line found strong shows of gas below 10,776 ft. Nearest production is 15 miles southwest in Louisiana. P. 59.

Another government sale of offshore leases may be in the offing. The Interior Department is polling the oil, gas, and sulfur industries to see if they're interested. They're being asked to nominate areas for leasing. P. 53.

Brooklyn Union's John Heyke outlines . . .

. . . The Case Against the Harris Bill

Paul Swain

Here's a report from the enemy camp—the Council of Local Gas Companies. This 40-plus company group is dedicated to killing any bill which would free gas producers from public-utility regulation.

The group plans a bitter fight in the nation's cities and towns, as well as on the floor of the U. S. Senate.

To give the oil industry a better idea of what it is up against, and some idea of the opposition's plan of attack, the Journal interviewed John W. Heyke, chairman of the council.

Here is a report of that interview—and an outline of the arguments the oil industry must overcome.

IF the newly formed Council of Local Gas Companies has anything to say about it, the Harris bill will never become the law of the land.

The bill squeaked through the House of Representatives by a 209-203 vote in the closing days of the last session of Congress.

Early in the coming session, the oil industry hopes, it will be safely through a Senate vote and independent gas producers again will be out from under federal control.

"Not if we can help it," says John Heyke, president of Brooklyn Union Gas Co.

Heyke — pronounced "Hi - Key" — heads the new council of distribution companies. Its only purpose—to block passage of the Harris bill or any similar legislation.

Up to now there has been loud opposition to the Harris bill and its Senate counterpart, the Fulbright bill. But it has been sporadic and from scattered areas. Heyke's new group consists of more than 40 gas-distribution companies, which have teamed up to defeat the legislation in the Senate.

Its emphasis will be on the local level. The idea is that selling local people is an indirect, but very effective, way of selling Senators.

Harris bill faults . . . Here's what Heyke's group objects to in the bill soon to come before the Senate:

. . . **Interstate transportation** is defined to mean AFTER the gas has been delivered to an interstate line and BEYOND the field where it is produced. This is contrary to the spirit of the Natural Gas Act and the Phillips decision.

. . . **Provisions to protect** the consumer are no protection at all. This is because the Federal Power Commission is not required in using the "reasonable market price standard" to consider "such factors as the economic value of the gas" where it is to be ultimately consumed.

Under the Harris bill, Heyke says, "reasonable price" could mean "the highest price paid by any purchaser in the producing area."

. . . **It is not proper** to allow pipeline companies who are also gas producers to charge "a reasonable market price" if this price is arrived at by merely taking on the most recently contracted price in the field.

Pipeline companies would benefit by every price increase in the field and

this would only serve to boost the price further.

Freedom no issue . . . To those who argue that the Harris bill defends free enterprise, Heyke has this to say:

. . . Regulation is not necessarily contrary to free enterprise. Heyke points out that every gas-utility company is regulated by state authority and they all operate under what he calls free enterprise.

. . . Free competition is assumed when free enterprise is mentioned. Heyke and his group insist that there has been no effective competition between producers.

They say it is between pipeline companies looking for more and more gas. The operation of escalator clauses, price redetermination clauses, and spiraling gas-purchase contracts are "a far cry" from free enterprise.

. . . Gas-marketing companies are permitted a reasonable return by regulatory commissions. They are not guaranteed a return in the face of meeting prices with other fuels in a competitive market.

. . . Producers' talk of "a few cents" per thousand feet means millions to the consumer.

"Each cent of increase at the well head adds over $50,000,000 a year to the bill of the natural-gas consumers of this country," Heyke says.

His group is most alarmed by figures of 25 cents and 35 cents a thousand feet quoted as the oil industry's evaluation of a reasonable price for gas. Heyke's organization figures that a 25-cent price means an increase of about 15 cents over the average price at the well head today "or $750,000,000 added to the country's present gas bill."

. . . Escalation clauses of one kind or another in pipeline purchase contracts are the most compelling reason for regulation.

These clauses are contrary to public interest under practically any circumstances. They result in unjustified price increases for producers which have no relationship to producer costs, risks, incentives or economic conditions.

With clauses such as these to trigger the cost of all gas purchases by local gas companies, it is impossible to foresee the future. The distributing company cannot do adequate over-all planning, financing, and it cannot tell the public what to expect in future as to the prices of gas.

In a nutshell . . . Heyke's position and that of his group can be summed up pretty concisely.

They strongly oppose the entire idea of escalation clauses in gas-purchase contracts.

They think the Harris-Fulbright bills condone the escalation principle, and therefore they are opposed to the legislation.

They not only oppose the bills. They are going to try and sell their story to their customers, their stockholders, their friends, their employes, and anyone else who will listen between now and the time the U.S. Senate takes up the gas legislation.

"We're not advocating regulation as such," Heyke says, but there are certain things going on now in the regulation of pipelines that we can't live with.

"We've given the pipelines a blank check and every time we turn around they raise the price. We have no control over the price a pipeline pays for gas. That price is passed right along to us and through us to our customers. The Harris-Fulbright bills give us absolutely no assurance of stability of prices. The legislation as now written is not in the public interest."

Heyke conceded that "some extremists" believe natural-gas producers should be under utility-type control just the same as gas distributors, but he insists he is not among them.

"We all do agree on one thing. The present bill is bad legislation from everyone's point of view."

On the same team . . . Heyke insists that gas distributing companies are little more than sales agents for producers and pipeliners. But, he says, they aren't granted the courtesy of even a consultation with reference to an increase in the price of their product.

"No manufacturing concern on earth would increase its price without first consulting its sales force to see just what effect a price increase would have

Distributors outline strategy . . .

. . . Here's the Plan of Attack

"GET the local distributors' side of the story into the public press as often and as prominently as possible."

That was the word sent to more than 40 gas-distribution companies last week. It was one of six major points in a grass-roots program designed by the new Council of Local Gas Companies to kill the Harris-Fulbright gas bill.

To get local press publicity, the council's program suggested that each company appoint a representative to talk personally with editors and publishers, civic groups, and public officials. Some paid advertising could be used, but the companies were warned not to overdo this.

Other major points in the program:

. . . See that individual customers get the story.

This can be done by inserts with gas bills, talks to local groups, special mailings to industrial and commercial customers who have a direct interest in costs. It was suggested that customers be asked to write their senators and other public officials of "their concern" in the matter.

. . . Carry the story to holders of distributing company securities by special mailings and to employes through group meetings and otherwise.

. . . Seek the support of company labor unions.

. . . Instigate public debate on radio and television.

The press should be urged to be present at such events. Efforts should be made to get debates with supporters of the bill, and if they refuse, to see that the press is informed.

. . . Enlist the support of local public officials.

Distributors were told it is vital that senators get the opposition side of the story from as many sources as possible. State public-service and city public-utility commissions can be of help in this respect.

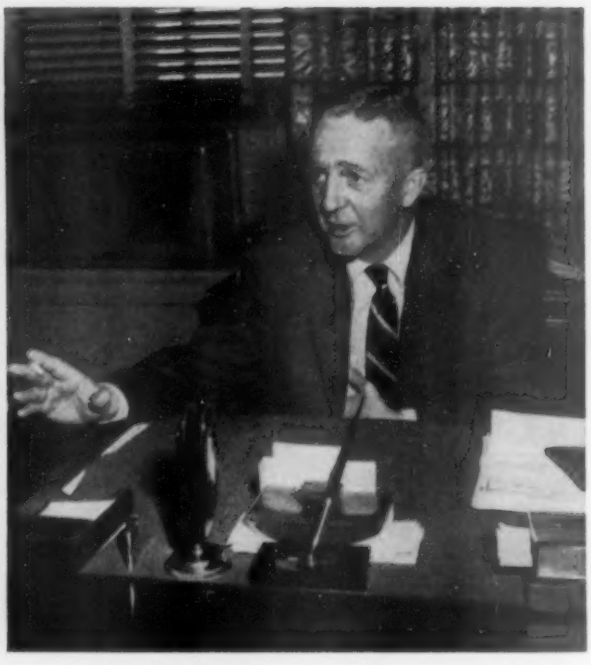
The council's program starts with the same type of campaign that the industry carried on last year to get the producers' side of the argument before the consuming public.

"Unlike the oil interests supporting the measure, we haven't at our disposal limitless funds for a national campaign," John Heyke, council chairman, said.

The plan . . . The fight against the bill will be based on the charge that exemption of independent natural-gas producers from federal price regulation could cost consumers well over $800,000,000 a year.

The Fulbright bill is the Senate version of the Harris bill which the House passed last session. It is due to come up on the Senate floor early next year. Senate Majority Leader Lyndon Johnson of Texas predicted it will pass. But Sen. Paul Douglas and his followers plan a filibuster to kill it.

More than 40 distributing companies have already joined the council, according to Heyke.



"They're trying to hold us up . . . as a bunch of thieves and robbers."

on sales. That's exactly what has happened to us and what will continue to happen. I asked the president of a big gas transmission company if he would come and talk to us first, before asking for another increase in rates. He said, 'Absolutely not'."

The Brooklyn Union president calls his business "the fuel business" and describes it as a "tough, competitive business." This is a fact gas producers and pipeline companies are prone to ignore, he says. He scoffs at recent statements of Dr. John W. Boatwright, economist for Standard Oil Co. (Ind.), concerning the zooming and yet unfulfilled demand for natural gas.

"I've invited Dr. Boatwright to go along with one of our salesmen and see just how much people are clamoring for natural gas," Heyke says with a wry grin. "I'd like to issue that same invitation to A. P. King, Jr., too." (Heyke just received what he calls a "rather vitriolic" letter from King, president of Texas Independent Producers and Royalty Owners Association).

"If Dr. Boatwright's ideas hold sway," he said, "we need holes in our heads for spending more than $1 million a year on sales promotion.

Heyke concedes Brooklyn Union's business is a good one. He expects it to grow even more, but he insists that a few more increases in the cost of his company's gas supplies and it will be "priced right out of the market." He says that has already happened in New England. Natural gas can't compete with other fuels in New England, he says.

"We've got 645 people in our service department at Brooklyn Union and we use them to build our gas business. They spend their time servicing gas appliances. We've already cut our gas rates to customers twice in the last few years and that's another bid for more business—in a competitive business. We could cut our service personnel, or cut service off completely, and probably we could reduce our rates again. But, we'd be losing what we regard as one of our assets in a competitive business.

"We're caught between trying to give service to our customers, gain more customers, and possibly reduce the cost to our customers more—and rising costs of gas."

Heyke insists that pipelines which bring natural gas from the producing fields of the southwest to densely populated areas like his own are financed "not on the credit of the pipeline—it doesn't have any—but on the credit of the distributing company which agrees to take the gas for 20 years."

"We've got more miles of main in the streets of Brooklyn than one of the transmission companies has from Texas to New York."

No gravy here . . . Heyke says Brooklkn Union buys "a raw material" at 10 per cent load factor and its customers take that gas at a 40 to 60 per cent load factor at the present time. He says he isn't sure where the $2.31 per thousand cubic feet price that is quoted as his company's income actually comes from.

"But when they compare that $2.31 figure up here to the 7.7 cents at the well head—that's the figure they like to use—they're clouding the issue. At a 40 per cent load factor our gas costs us $1 to $1.25 per thousand feet because the flat demand charge of 25 cents per thousand has to be spread over a much smaller amount of gas."

Heyke says about 20 per cent of Brooklyn Union's customers are apartment house dwellers who use gas only for cooking—usually only one meal a day. They are what he calls "minimum bill' customers and pay $1.13 a month.

"It costs $1.70 to install a meter, dedicate capital facilities, read the meter, and for customer accounting for that minimum bill customer," he says.

Oil's approach irksome . . . Heyke says local gas distributors are more than a little bit peeved at the campaign staged by the oil and gas industry to put its story across.

"They've tried to hold us up to our customers as a bunch of thieves and robbers. That's a hell of a way to treat your sales force. If we can't sell it, the gas is no good to anyone in the ground.

"What the oil industry has been doing is like General Motors buying advertising to tell the public not to buy its cars because the dealers are stealing them deaf, dumb, and blind."

Drilling Secrets Found

Scientists present new theories on making hole faster; practical field tools, procedures still must be designed

DALLAS.—Scientists are telling the oil-well driller they have found ways to make hole faster. But their laboratory research must be translated into practical field tools.

Three developments are needed:

. . . A balanced drilling mud that clears chips quickly from bottom of hole.

. . . A modified jet bit that directs fluid stream at cutting edge.

. . . A chemical additive to mud that softens the rock—a lesson from Russia.

These are the conclusions of Donald Gideon, Ralph Simon, and Horace Grover, of the Batelle Memorial Institute, Columbus, Ohio. They conducted an 18-month research program for the American Association of Oilwell Drilling Contractors.

The lab men are quick to point out their fundamental research is not a cure-all for conditions slowing up penetration rates. The new ideas single out the nature of the trouble. They are a guide for designing new drilling tools and procedures.

Chips on the move . . . Clearing cuttings from bottom of the hole speeds the penetration rate. This gives the drill bit an unobstructed path.

The researchers find drilling fluids are the key to moving chips. After studying how physical properties of fluids relate to chip clearance, they report: Keep the ratio of viscosity to density as low as possible.

Experiments show that dynamic viscosity coefficient is the most important physical property of drilling mud for chip clearance. Gel strength and density are of less consequence. Filtration rate has no measurable effect.

Various fluids show different effectiveness in clearing chips. Fluids of low viscosity, such as water, are much more effective than viscous fluids, such as bentonite mud. The researchers set up a test to compare the minimum flow rates of fluids required to move a certain amount of chips from bottom of the hole in a given time.

They found it took 30 gal. of water per minute to clear the chips. Minimum flow rate for barite mud was 40 gal. per minute; mineral oil, 53 g.p.m.; attapulgite mud, 65 g.p.m.; and bentonite mud, 80 g.p.m.

Since the gel strength of the heavy barite mud is nearest to that of the viscous attapulgite mud, the comparison is significant. It shows that greater density of the fluid also reduces the minimum flow rate for clearance. Also the tests reveal the effect of gel strength. While the attapulgite mud was maintained at the same Stormer viscosity as the bentonite mud, its gel strength was lower.

The Battelle researchers say that practical application of their findings depends on field studies. Compromise is necessary here because drilling fluids are prepared to meet a number of requirements in addition to removal of cuttings.

Fluid on target . . . The hydraulic system of the bit can make or break a fluid as a chip mover.

The Battelle studies show graphically that you can make hole faster by aiming the fluid streams directly on the point where cutters meet rock. In tests, jet roller bits show a 2-1 advantage in flow rate over the standard bit. The added fluid turbulence created by forced streams from the jet bit is an aid in clearing chips.

This turbulence is stepped up when the jet bit is modified. One-half inch angled tube is welded to each jet opening to direct the fluid streams toward chipping positions under each roller. This replaces the perpendicular stream of the standard jet bit.

The result is a greater circular fluid velocity under the rollers. It measurably increases the rate of chip removal.

Because of the current interest in using air and natural gas in drilling, clearance times for air also is measured. Again it is found that the modified jet bit, with its directional blast of air, is most effective in removing chips.

Just a word of caution, though: Further field studies will be necessary to prove the economics of such a bit. The researchers say that actual design of a practical bit patterned after their modified experimental tool will depend on a number of factors. They add the future jet bit probably will be a compromise—somewhere between the ideal hydraulic system for best chip clearance and a long-lived bit yielding most drilled hole per dollar.

Idea from Russians . . . The Battelle scientists confirm reports by Russian researchers that "hardness reducers" speed drilling rates.

Electrolytes are used as the softeners. They include sodium hydroxide, calcium hydroxide, sodium carbonate, sodium silicate, and sodium phosphate. After the chemicals soften the rocks, the drill bits find going easier and quicker through the formation.

The biggest problem, however, is in applying the chemicals.

Russians claim penetration benefits from chemical softeners range up to 30 and 60 per cent. Battelle researchers warn these gains must be weighed against costs and complications in the mud program which may arise.

Congress, Justice to decide . . .

. . . N.P.C. May Remain on Job

WASHINGTON.—The National Petroleum Council, as now set up, will be continued for another year—unless it is hamstrung by Congress or the Justice Department.

Interior Secretary Douglas McKay this month appointed the 12 men who will comprise the N.P.C. next year. All but five were renamed from the 1955 council.

"The effective working relationship between the federal Government and the petroleum industry maintained for over 9 years is a magnificent tribute to the members of this council," McKay said in his letters of appointment.

The new council will assure the continuous flow of valuable advice and information on oil to the federal Government, he declared.

The N.P.C. has been under attack from the House judiciary committee headed by Rep. Emanuel Celler of New York. Celler is expected to open hearings on the council's makeup and activities next month.

A new order limiting the activities of industry advisory committees is under study in the Justice Department, Asst. Atty. Gen. Stanley N. Barnes told Celler's committee. But Barnes said the order may never be issued, and refused to give any details of it.

Barnes indicated that even if the order is put out it may not make any material change in the N.P.C. makeup. The council is the only advisory group officially authorized to work under an industry chairman. All other such committees are supposed to have government men as presiding officers.

The first meeting of the 1956 council is expected to be held late in January.

FIRST STATEWIDE GAS PRORATION hearing last week in Louisiana attracted over 100 pipeline men.

Louisiana gas rules are confusing . . .

. . . Proration Needs Practical Touch

NEW ORLEANS.—Louisiana's new order establishing statewide gas proration for the first time may be eased slightly before it goes into effect.

State Conservation Commissioner John B. Hussey, confessing that "there is some confusion," said changes will have to be made in the recent order *(The Oil and Gas Journal, November 28, page 51).*

Hussey said one of the amendments under consideration would soften the provision for immediate shutdown of wells exceeding their allowables. The order, as originally issued in November, provided that "Any well having a cumulated overproduction status on the first day of July of any year shall be closed in and not produced until such overproduction is entirely eliminated."

The proposed amendment, Hussey said, would give the operator 60 days to compensate for any overproduction at the end of the fiscal year. But it would apply only to wells whose excess output totaled no more than 4 per cent of their annual allowable or 50,000,000 cu. ft.

Hussey explained that the proposal for a maximum tolerance recognizes the fact that strict control over the day-to-day output of each well is not practical.

Little opposition aroused . . . The commissioner's remarks caused little stir among the more than 100 pipeline representatives attending the first hearing on purchase nominations held last week.

There seemed to be no organized opposition to the principle of ratable take; not a single question was raised concerning the precedent-setting order.

Hussey later said pipeline companies have accepted the stricter regulation "a lot better" than producers have. He predicted, though, that statewide proration will help all segments of the gas industry. He forecast these benefits:

. . . **Landowners will be assured** a fair share of the gas production from their property.

. . . **Finances of producers** will be stabilized, making their operations more attractive to banks.

THERE'LL BE SOME CHANGES MADE in the new gas-proration order, says John B. Hussey, Louisiana's conservation commissioner, second from right. With him, left to right, are T. M. Winfield, chief engineer for the conservation department; Peter Huth, district engineer; and Leo Hough, state geologist.

. . . The Federal Power Commission will have assurance that gas produced in Louisiana is going to markets to which it has been dedicated.

How it will work . . . Ratable take, which goes into effect January 1, will be determined field by field.

District managers of the conservation department will set allowables for individual wells following conferences with interested parties.

Purchasers, transporters, and users of natural gas must submit purchase nominations in March, June, September, and December. The first such meeting under the new system was held in New Orleans December 9.

The ratable-take order puts gas output under controls similar to the long-established orders governing oil production. It applies to all "nonassociated" gas pools in the state, exempting oil fields which produce casinghead gas and certain fields covered by special cycling or pressure-maintenance orders.

Proration of gas production is not new in Louisiana. But now, for the first time, a statewide system has been set up providing simultaneous "balancing out" for wells exceeding their allowables.

If it proves practical, the Louisiana experiment may set the pattern for controls in other gas-producing states.

. . . Texas Tries Experiment

AUSTIN.—The small Alco-Mag field in Harris County may serve as a proving ground for ratable take of gas in Texas.

The Texas Railroad Commission has set up a proration system under which it will try to decide the true market demand. It will not rely solely on producer and purchaser nominations. The market will be divided equally among the field's 13 wells, even if some have no pipeline connection. The field is capable of producing 34,682 M.c.f. daily.

Commission Chairman William J. Murray, Jr., an outspoken advocate of ratable take, sees the action as a significant experiment, "a realistic approach to a complicated problem." Commissioner Olin Culberson says: "We're finally taking steps to do what the law requires—that producers shall have equal withdrawals. I've been advocating something like this for the past 7 years."

Industrial Gas Supply Corp., Houston, one of two operators in Alco-Mag field and a buyer as well, may produce only its pro rata share of the market demand. To fill the rest of its needs, Industrial has to buy from the other producer, Russell Maguire, or turn to another field.

WATCHING WASHINGTON

Bertram F. Linz

New Probes, Old Subjects

Investigation will be the order of the day when Congress gets back to work next month.

Several committees are planning to get an early start on probes of the oil industry. The groundwork for some has been laid over the past few months.

One of the first matters to come up will be the long-proposed West Coast pipeline. A House armed services committee held some hearings on this last session. Chairman F. Edward Hebert of Louisiana plans to call in Adm. Arthur W. Radford, chairman of the Joint Chiefs of Staff. He will be asked, first, to explain why the Defense Department has refused to support the line in the past and, and, second, whether it has changed its position.

Defense Mobilizer Arthur S. Flemming also is to be asked whether the line should be built as a protection to West Coast oil supply in the event of war.

West Coast oil interests don't believe a pipeline to bring in Texas oil is necessary. They point out that Canadian oil is is now coming in and a big supply of Canadian gas will be available soon.

Interior and Defense oil experts told Hebert last July that there is no peacetime need for a pipeline. And in the event of war West Texas crude would be needed to meet eastern requirements, they said. The strategic value of a line is not great enough to justify the use of government funds to build it, the congressman was told.

Navy Isn't Swapping Oil

A handful of congressmen, and not the Navy, will decide whether Standard Oil Co. of California is to be allowed to take its oil and get out of the Elk Hills naval reserve.

Standard proposed several years ago to trade its interest in the Stevens zone for oil from the shallow zone. It wanted to produce its share of the reserve as quickly as possible. It then would pull up stakes and leave the area to the Navy for development to meet wartime needs.

Navy officials, it is indicated, have no intention of trying to work out a deal with the company unless the House and Senate armed services committees first lay down the conditions to be met.

The House committee is headed by Rep. Carl Vinson of Georgia. Vinson knows as much as anyone at the Capitol about military matters, and probably more than anyone else about the Navy. So far, he has been cold to the offers made by Standard. But he probably would approve a deal weighted in favor of the Government.

Under its present arrangement with the Navy, Standard will be producing from the Elk Hills reserve for another century and longer. Even if a trade could be made, Socal probably couldn't get its share of the oil in less than 20 years.

U. S. Leery of Forecasts

A new way of getting world supply and demand forecasts now made by the Foreign Petroleum Supply Committee is being sought by the Justice Department.

The forecasts are invaluable to national defense, Asst. Atty. Gen. Stanley N. Barnes told Congress this month. But there "may be real" possibility of antitrust law violation in the way the committee operates, he said.

The department is bothered because five of the principal defendants and six of the alleged coconspirators named in the Government's cartel suit are members of the 1953 voluntary supply agreement under which the committee operates.

There is a possibility of tacit agreement or overt pressure by agreement participants to abide by their production estimates. The effect would be to turn the estimates into production quota agreements, Barnes explained.

Barnes believes another way should be worked out to get the data from the same sources used by the committee. But he indicated the department will not be pushed into quick and possibly unwise action by the outcry against industry advisory committees.

The defense importance of the problem calls for careful deliberation and judgment, Barnes said. National defense must be weighed against antitrust considerations. The voluntary agreement should not be scrapped until an equally effective means of compiling the estimates is worked out.

SACKS OF MUD weighting materials are stacked at world's deepest well to make heavier mud for bringing high down-hole pressure under control.

MUD-WEIGHT recorder tells the story.

Deep Well Still Kicking

But drill pipe is being snubbed in and circulation is being restored; the question: What's causing the kick?

Ed McGhee

PORT SULPHUR, La.—The world's deepest well still is dealing real trouble. But its operator, Richardson & Bass, is confident that time and careful handling will bring the well under complete control.

Since the deep test began kicking on December 8, there has been at least 1,900 psi. on the blowout preventers at all times.

By late last week, rig crews were able to "snub" 13,600 ft. of drill pipe into the hole and break circulation. A mud of 18.3-lb. weight was being pumped into the hole and circulated at 13,485 ft. against 1,200 psi. held on the blowout preventers.

Trouble pulling pipe . . . The kick came while the drill pipe and bit were being pulled out of the hole from 22,559 ft.—deepest penetration of this hole and the world's record drilling depth.

At the time, all but five stands of pipe were out of the hole. The crew began to run the pipe back in, but they could get in only another 3 stands before having to close in the blowout preventers. Almost immediately, the pressure on the preventers went up to 2,800 psi.

After some 2 days of waiting during which heavy mud was being mixed, the pressure fell to 1,900 psi. and stabilized there. This drop in pressure was probably due to gelling of the mud in the hole. Bottom-hole temperature was about 350° F. and the lime-base mud could be expected to gel some after long exposure to this elevated temperature.

At the time of the kick, the well had two 10-in. series 1500 ram-type blowout preventers and one series 1500 bag-type preventer on the casing head. Now a 6-in. double-gate preventer has been added and snubbing equipment installed.

As pipe was snubbed back into the hole, pressure on the well began to rise. Therefore, the well was bled through a choke to keep the pressure around 2,000 psi.

Since the last casing run in the well—a 7-in. string—was run as a liner, the last string of casing at the surface is a 9⅝-in. intermediate string. While this 9⅝-in. is adequate to hold all pressures so far imposed on it, it can't be expected to hold much in excess of 5,000 or 6,000 psi.

Record pressure . . . Exactly what has caused the kick is not yet known.

Nothing from the formation has arrived at the surface except drilling mud. Since the kick came while pipe was being pulled, it is likely that the swabbing action of the drill pipe and drill collars pulled formation fluid into the hole. The fluid could be high-pressure oil or gas, or it could be a strong salt-water flow.

Richardson & Bass officials feel that, in all likelihood, the kick is from a formation at the bottom of this world's deepest well. An 18-lb. mud was being used in the hole when it kicked. And static bottom-hole pressure at 22,000 ft. with that mud would be more than 19,000 psi.—far more than ever measured in any petroleum reservoir yet discovered. If swabbing is responsible for the kick, actual bottom-hole pressure would have been slightly lower than the 19,000 psi. figure.

The bottom of the 7-in. liner is at 19,752 ft., so there is some 2,800 ft. of open hole in this well. The kick could be coming from a formation above actual bottom.

First real trouble . . . The blowout threat is the first real trouble on the test which was spudded February 28 as the 1 LL&E-Humble "L" 35 miles southeast of New Orleans. A string of drill pipe was cemented up once and there has been one fishing job.

Since passing the old depth record of 21,482 ft. on November 9, the crews have drilled ahead smoothly at 40 ft. per day. Formations have been sands and shales. Cores have been taken at 20,753 ft. and 20,791 ft. Reportedly the upper part of the section showed oil and several lower intervals have indicated possible production.

Another Newcomer in Dallas' Skyline

DALLAS.—The nine-story Meadows building, new home office of General American Oil Co. of Texas, was formally opened in Dallas recently. The new structure, termed the most beautifully designed building in the Southwest, cost $4,000,000.

It claims as one of its unusual features the largest hanging garden in the world. Full-length balconies from each floor level overlook the hanging garden and a landscaped parking area accommodating more than 500 cars. The building is named after Algur H. Meadows, General American founder. It is owned by the company's employes' retirement plan. General American occupies the eighth and ninth floors.

Another firm is optimistic . . .

. . . Texaco Budget $325-Million

NEW YORK.—The Texas Co. will spend a record $325 million for capital investments in 1956, a 10 per cent increase over the $295 million outlay this year.

Looking ahead another 5 years, the company is considering plans to spend more than $1,500,000,000 to improve and expand the facilities "along the line." Texaco has invested $2,000,000,000 in property, plant, and equipment since the end of World War II.

These figures and other details of Texaco's operations and plans were revealed last week by Augustus C. Long, president of the company, in an address to New York's Society of Security Analysts.

"I hardly need point out that we would not be making these plans unless we were optimistic about the economic vigor of the country, the future of the petroleum industry, and the prospects for the continued growth of The Texas Co.," Long commented.

He is the third major oil-company executive in 3 weeks to appear before the Security Analysts and speak in the same general vein of optimism. He was preceded by Dr. Robert E. Wilson, Standard Oil Co. (Ind.), and M. J. Rathbone, Standard Oil Co. (N.J.)

Long told the analysts that Texaco's policy of maintaining domestic net crude production at 60 per cent to 70 per cent of the total refinery requirement of the company caused a stepup in domestic drilling operations during this year. He called it an expensive operation and said 1955 expenditures for domestic production will amount to $165 million. More than $200 million was spent this year for production activities in the Western Hemisphere.

Reserves and imports . . . The company had domestic reserves of crude oil and natural-gas liquids totaling 2,100,000,000 bbl., or 6.1 per cent of all industry reserves, at the beginning of 1955.

This figure will be increased this year as new discoveries and field extensions will more than offset withdrawals. Texaco's worldwide reserves are set at 14,000,000,000 bbl.

The Texas Co. president said he doesn't feel imports need to be restricted either by legislation or government regulation. He particularly lashed out at the 7 per cent cut recommended for imports from all countries other than Canada and Venezuela.

"We feel strongly that imports should be made from all friendly trading nations on the same basis, and there should be no discrimination between countries in the Eastern Hemisphere and those in the Western Hemisphere," he said.

Gas Men Lose Again

Controls apply if some gas moves out of state

WASHINGTON.—A Federal Power Commission examiner has held that sales of natural-gas producers are subject to federal regulation even if it cannot definitely be shown that all the gas moves into interstate commerce.

The decision grants certificates to seven producers in the South Elk Basin Unit Area in Park County, Wyoming, to continue sales to the Montana-Dakota Utilities Co. The producers filed applications for certificates, but contend their sales are not subject to FPC control.

The gas sold to Montana - Dakota moves through its Elk Basin compressor station into its Billings Division pipeline. There it is commingled with other gas and then moves across the state line into Montana. Some of the gas is stored underground in Wyoming temporarily. But it is merged with other gas and moves into the pipeline where all or part of it is transported into Montana.

It is not possible to demonstrate that "any particular molecule of gas" produced by the applicants flows across the state line, Examiner Richard N. Ivins admitted in his decision. But it is clear, he said, that "the stream of gas flowing toward the Montana line with which applicants' gas is commingled when it passes through the compressor station must include gas produced by these applicants, and that volumes of commingled gas are thereafter immediately transported in interstate commerce for resale."

The examiner also rejected the producers' argument that the gas was sold before completion of production and gathering. The FPC in a previous case ruled that such sales are not exempt, he said.

The producers are Continental Oil Co., Knox Oil Co., Wyopark Oil Co., and Oxford Oil Co., all of Houston; Fred M. Manning and the Estate of E. E. Brown, Denver, and Freed Goosstein, Casper, Wyo. They were given 20 days to file an appeal for review.

Emphasis on Floods

Success of projects plus general decline of North Texas fields increase operators' interest in water flooding

Edwin McGhee

WICHITA FALLS, Tex.—Successful water [illegible] North Texas [illegible] feet, is the advice to the group from L. E. [illegible] ed Enter-

Foster Flood Asked

Stanolind wants to try water injection on 20-year-old Texas field; Stanotex Kelly-Snyder pilot flood approved

AUSTIN.—Stanolind Oil & Gas Co. is planning a pilot flood on one of its leases in 20-year-old Foster field of Ector County to see if water injection can give the big pool a new lease on life.

Foster, which produces from the Grayburg at about 4,100 ft., is nearing the end as far as primary oil recovery is concerned. The 34,000-acre pool has [illegible] wells. [illegible] ble for the [illegible] about gas into the gas cap, at about 8,000,000 cu. ft. daily, would continue.

The Texas Standard project, a five-spot on 70 acres to start, is designed to see if a full-scale flood of the Cisco under the firm's 1,200-acre G. E. Parks lease is desirable. (*The Oil and Gas Journal, January 31, page 127.*)

There are 30 wells on the lease, which had produced about 1,500,000 bbl. as of December 1, 1954, of the 12,000,000 bbl. estimated in place originally.

Texas Floods Approved

Additional oil recovery expected to be 70,000,000 bbl. in North Ward Estes, Cree-Sykes, and Sojourner fields

[illegible] Com- eventually, the H.S.A. project to 2,173½ acres and finally to 5,635 acres.

[illegible] will get its injection water from [illegible] kish water

Flood Permits Asked

Texas Railroad Commission studying six injection plans for secondary recovery projects in West and North Texas

AUSTIN.—Plans for two more water-flood programs in a growing number of projects proposed for the Yates sand of Pecos Valley High Gravity field, Pecos County, West Texas, have been laid before the Texas Railroad commission.

The two floods are planned by [illegible] & Hostetler, Monahans, Tex., and Carmack Drilling Co.

The Buckles & Hostetler project [illegible] flooding the Yates under [illegible] of about 1,430 acres.

J. Hostetler, testifying at the hearing, said the 22 [illegible] edge currently are producing [illegible] of about 150 bbl. daily [illegible] though discovered in [illegible] field, Callahan County, North Texas. Applicant would use a five-spot, 7-acre flood pattern and a closed system. The 25 wells on the acreage have pro- [illegible] 281,627 bbl. of oil [illegible] esti-

Eight Floods Okayed

Commission approves West [illegible] and North Texas projects

AUSTIN.—The Texas Railroad Commission has given eight water-flood [illegible] projects in Texas the go-ahead and has [illegible] Texas [illegible] for another [illegible] said

Deeper Flood Ready

Gulf plans new Goldsmith water-injection project

ODESSA, Tex.—Gulf Oil Corp. has completed plans for a pilot water-flood which could grow into another whopper in the prolific Goldsmith pro- [illegible] ducing [illegible] West [illegible]

New Flood Sought

Two pilot projects also up for action by commission

AUSTIN.—Hudson & Hudson, Inc., is seeking Texas Railroad Commission approval for a water flood which would increase oil recovery from the Yates sand under eight leases in Emperor field, Winkler County, an esti- [illegible] mated 3,000

Humble says new wells penalized . . .

. . . Unlimited Water Floods Challenged

Robert J. Enright

DALLAS.—A battle of keen interest to the entire oil industry is brewing in Texas over current unrestricted production from water floods.

The country's largest domestic oil producer—Humble Oil & Refining Co.—is challenging the state's practices. If Humble wins, it means:

. . . **Allowables for water-flood** wells like all others.

. . . **Thus a production pinchback** for many large oil firms and a host of small independents.

. . . **A new regulation pattern** for other states to follow.

Operators of water-flood projects reacted quickly. They marshalled technical facts and political strength to oppose Humble in a running battle before the Texas Railroad Commission.

What's at stake? . . . Water-flood production inevitably will play a larger role in the domestic oil industry.

As new fields get harder to find, the percentage of water-flood output to total production will continue to rise. There is no way of knowing how much of our oil production today is secondary oil. All that can be said for sure is the volume is considerably larger than it was several years ago and the trend promises to rise steadily.

This trend prompted Humble to raise several basic challenges:

. . . **Are new wells and fields penalized** unnecessarily by lower allowables to let water-flooded wells flow freely?

. . . **Can restraints be placed** on a water-flood without damaging it and decreasing ultimate recovery? If controls are impractical,

. . . **Can production be lowered** at any stage of the water flooding?

What is being done . . . State conservation agencies generally permit the operator who water floods a depleted oil field to produce all the crude he can.

The theory is that oil is conserved by this practice. The state wants the operator to continue to recover every drop of oil possible from the field. Most engineers have felt that more oil can be recovered from a water flood ultimately if production rates remained high.

The Railroad Commission permits Texas water-flood wells to produce up to "yardstick" or depth brackets allowables. If it should appear later that the wells will produce more than the "yardstick" allowable, the operator can request higher allowables at a hearing before the commission. So far the commission hasn't turned down any of these requests. Secondary water floods also are exempt from Texas shutdown days.

Pressure - maintenance floods, where water is injected much earlier in the life of a field, do not receive this treatment nor do gas-injection projects.

The test cases . . . The shutdown for changing all this came recently.

The commission had before it two separate applications for higher-than-yardstick allowables for water floods in depleted oil fields.

The first was filed by F. Kirk Johnson, Fort Worth independent, for an increase in per well allowables to 150 bbl. over the existing 54-bbl. yardstick. The project is in Kermit field of Winkler County, West Texas.

The second was Standard Oil Co. of Texas. It made a similar request for a flood on its Adams and McFarland leases in North Ward Estes field of Ward County, also in West Texas.

Humble appeared at both hearings to urge that higher allowables be rejected.

The case against . . . Humble emphasized its objections were directed at the over-all problem and not at the two projects as isolated problems.

It pointed out that primary producing or proratable fields in the state have had production curtailed until they are permitted to produce an average of only about 15 days a month. Allowable hikes for water floods are aggravating this situation unnecessarily, Humble said.

Humble's key argument against such increases was that high producing rates in such floods aren't necessary to prevent waste. In other words, injection and production rates could be curtailed and the floods still would produce just as much or more oil ultimately.

This stand was taken, Humble said, only after careful study of results of research carried out by the company over an extended period—mostly laboratory work.

Predicting how a reservoir under either natural or induced water drive will behave, Humble admitted, is difficult. Besides the question of flushing efficiency, such things as pattern efficiency, fingering and coning of encroaching water, and high water-oil ratios from some wells become important.

Humble said it had found, however, that it could whip these problems in natural water-drive fields by developing the reservoirs and producing the wells properly.

Even better controls are available in the usual secondary water flood, it argued. For, along with controlling the producing wells, an operator can control water-injection rates and put the water where it is needed when it is needed.

On these grounds, Humble asked not only that secondary water floods be denied increased allowables over yardstick figures but that existing high flood allowables and exemptions of such projects from shutdown days be conceled.

The case for . . . Humble might just as well have dropped a series of bombs in Texas' water-flood areas—namely West Central Texas and North Texas and to a lesser extent the Permian basin. The reaction from water-flood operators in these areas was quick and vigorous.

The West Central Texas Water Flood Association appointed a committee to study Humble's stand and to recommend action. The committee went over the Humble testimony. It examined exhibits and evidence in support of allowable increases for Texas water-floods since 1950. It gathered and studied "the latest published findings on ultimate recovery as a function of rate of flooding."

The committee reported back to the association that it could "find nothing to support the Humble position on this matter and further could find nothing to warrant a change in the present commission policy with regard to water-flood allowables. Further we find that a change in policy on water-flood allowables could be a serious threat to the conservation of hydrocarbons in Texas."

It recommended that the association:

. . . **Send out a statement** setting forth its position to the Railroad Commission and to Humble.

. . . **Warn other water-flood** operators in other areas of the threat.

. . . **Build a file** of information on the subject available to association members.

. . . **Prepare to take** further defensive action as needed.

The alarm spread quickly and by late November the North Texas Oil and Gas Association and the Permian Basin Water Flood Association had pledged to join the West Central Texas group to thwart any changes in water-flood-regulating policies such as urged by Humble.

Spokesmen for the water flooders argue that by far the bulk of technical findings on effect of rate hold that high and continuous rates of water injection and oil production are necessary for maximum ultimate recovery.

Plight of independent . . . Further, they say, a great majority of water floods are relatively small projects carried out by independents. The water flooders claim their financial positions are such that it's impossible for them to wait years for the investment to pay off.

The independent cannot and would not spend $500,000 now so that he could recover perhaps $600,000 over the following 10 or 20 years. He has to get it back quicker than that to keep operating. This essentially is what the situation would be if Humble's suggested regulations were adopted. A result would be that a great number of likely projects never would be started and thus a great quantity of recoverable oil lost.

They point to the fact that Humble is apparently the only company objecting to the way things are done now.

The big reason Humble does object, they contend, likely is because it has very little secondary oil—due in part to a long-standing policy by which it prefers to sell depleted production rather than water flood it. It would be to Humble's own interest then, they argue, for it to try to cut the volume of water-flood oil.

The result . . . Humble lost the first round. But the battle will continue.

The commission approved higher allowables for water floods of both F. Kirk Johnson and Standard of Texas over Humble protests.

But the commission announced it would review the status of all 429 Texas oil fields now exempted from shutdown. Tighter regulations may result, although the commission does not intend to reconsider the secondary floods in the hearings in February.

The commission said there are instances of new zones being found in depleted fields which are being produced under the exemption allowed for water floods. Such cases will be weeded out along with other instances of fields being exempted which do not qualify.

Humble is expected to continue its opposition against water floods. It objected early this month to unlimited allowables and exemption from shutdown days for a pilot water flood. The project was installed by Gulf Oil Corp. in McElroy field, Crane County.

Gulk asked for exemptions so it could determine as quickly as possible whether a field-wide flood of the Grayburg formation is feasible.

Problem nation-wide . . . Just how much incentive secondary water floods should get and whether such production can be controlled without loss of oil isn't a problem for Texas alone.

Oil operators and government officials over the country also have been concerned almost since the first water flood proved successful.

Research on the rate sensitivity question has been carried on by companies and oil associations for a quarter century or more.

But the nature of a water flood is such that no matter what the results of a research project, someone usually can find basis to disagree with them.

Where laboratory tests are concerned, dissenters say you can't successfully apply findings from individual cores to the infinitely bigger and more complicated reservoir.

Research in the field is difficult because you can't back up and flood again to see how the reservoir might act under different treatment. The pay sand will never again be in exactly the same condition as when you started.

Even where comparative tests were launched side by side in the same field at the same time, dissenters still could say that porosity, permeability, or other rock characteristics varied between the two . . . or find other fault.

Compact study stalled . . . The Interstate Oil Compact Commission has become well aware of the difficulty of trying to develop reliable information on the subject.

At the compact's meeting in Oklahoma City in December 1953, a subcommittee of the Secondary Recovery and Pressure Maintenance Committee

was set up to study the "effect of curtailment on production on the ultimate recovery from secondary recovery projects."

Such reliable information as was gleaned from this study was to be used primarily to advise state conservation agencies when the latter asked for such information.

The compact recognized in setting up the committee than "an increasing percentage of the oil production in many states can be expected to come from water-flooding operations." Such operations in 1953, it said, accounted for "virtually all oil production in the Appalachian producing area and between 15 to 25 per cent of total output in the Mid-Continent states."

It termed the problem one of growing importance and deserving of close attention of the industry and of state regulatory bodies.

The subcommittee admitted at the September 1954 meeting of the compact in Omaha that it had made little headway. It advised the parent committee that facts it had been able to gather weren't sufficient to permit definite conclusions much less recommendations.

At the Chicago meeting in December 1954, the subcommittee conceded defeat. Its report stated that the information obtained had been so conflicting that no conclusion or recommendation could be made.

The problem was tossed back to the parent secondary recovery and pressure maintenance committee which decided to continue "through all possible channels to encourage the development of information on this important subject in order that reliable advice could be presented, if requested, to state regulatory bodies confronted with the problem of control of secondary oil production." So far no report has been made.

A thorough, comprehensive report from the compact on the question undoubtedly would swing a lot of weight.

It appears now, however, that there will be more and better battles in the future between those who feel water floods are getting too big a break and those who don't.

Paul Fitzgerald, left, and Merrill W. Haas look over contest entries as. . . .

Petroleum Geologists Hunt an Emblem

SOMETHING has caught the eye of the men shown above.

It may turn out to be the new official emblem to be selected for the American Association of Petroleum Geologists.

Entries have come in from all over the world. They are being checked by Merrill W. Haas, exploration manager for Carter Oil Co., and Paul Fitzgerald, of Dowell Incorporated, both of Tulsa. Haas is chairman and Fitzgerald is vice chairman of the 20-man committee that will screen entries for final judging.

Everyone—A.A.P.G. members and nonmembers alike—may submit an entry. The main requirements are that it have beauty and express the objectives of the association. Also, it must be suitable for use as a medallion, a letterhead, seals, buttons, flags, and even ashtrays and chinaware.

The winner will be chosen during the forty-first annual meeting of the A.A.P.G. in Chicago April 23-26. First prize will be $50, second prize $25.

Processing Briefs

FINDLAY, Ohio. — The Ohio Oil Co. will close down its Lovell, Wyo., refinery after August 1 next year. The company says limited market in the Rocky Mountain region and high cost of moving refined products to other areas prompted the decision.

Ohio opened the Lovell refinery in 1937 as an asphalt plant. It used Ohio's production in the Big Horn basin. In recent years the plant has been refining an average of only 3,000 bbl. of oil daily. Capacity is 6,500 bbl. daily.

LOCKPORT, Ill.—The Texas Co. will begin work next year on a 180-ton-daily anhydrous ammonia plant using cat reformer hydrogen from its refinery here. The gas will come from two units: a fixed-bed, 9,000-bbl.-daily Hydroformer, and an 11,000-bbl.-daily Platformer placed on stream this year.

PORT ARTHUR, Tex.—The Texas Co. next year will add an 80,000-bbl. daily crude unit and a new fluid cat cracker to its 210,000-bbl. daily refinery here. While new crude facility may replace some existing capacity, Texaco expects a big over-all gain in throughput at the Gulf Coast plant.

PORT NECHES, Tex.—Texas-U. S. Chemical Co. plans to boost output of its copolymer plant here, currently producing at the rate of 110,000 long tons per year.

The firm, jointly owned by The Texas Co. and U. S. Rubber Co., bought the plant from the Government earlier this year. Also acquired was an undivided one-half interest in a butadiene plant here.

LOS ANGELES. — Shell Chemical Corp. will add new equipment at its Torrance synthetic rubber plant to make cold high solids latex used in making foam rubber. The new facilities will involve additional basic reactor capacity as well as latex finishing equipment.

LOS ANGELES.—Malco Refineries, Inc., has awarded the engineering contract for its million-dollar marine terminal at Huntington Beach to Ehrhart & Associates, Inc., Los Angeles. Foreign crude will be received there for the 24,000-bbl. daily Norwalk refinery purchased last month from Wilshire Oil Co. *(The Oil and Gas Journal, November 21, page 88).* The company said more than half the crude charged to the refinery would be imported, probably from the Middle East.

Offshore big-leaguer . . .

. . . Kermac Expanding Fleet

NEW ORLEANS.—Kerr-McGee Oil Industries, Inc., is holding its place as one of the Gulf's major offshore drilling contractors.

The firm has expanded its drilling fleet with a new self-contained mobile drilling platform featuring several innovations in design. It is similar to two other platforms put into service previously.

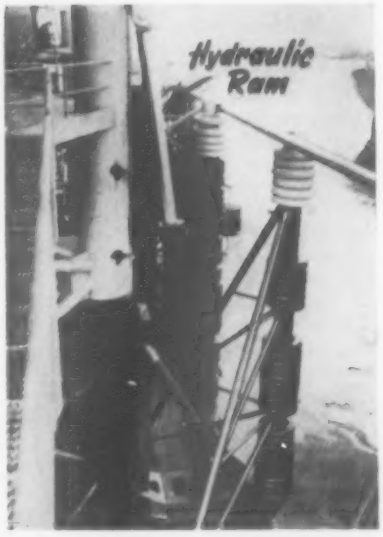
Kerr-McGee also has two more mobile platforms on order for service in deep water. Three veteran tender-platforms round out the Kerr-McGee fleet. A fourth has been ordered.

The latest mobile platform was designed by Kerr-McGee's marine engineering staff and built by Ingalls Shipbuilding Corp. of Pascagoula, Miss. It moved directly from the shipyards to its first job, a contract well for The Texas Co. in the Ship Shoal area off Terrebonne Parish, Louisiana.

The rig, a submersible type, will operate in water up to 35 ft. deep. It is submerged by pumping water into the hull which supports the drilling rig and other equipment. The vessel is stabilized during submersion by two pontoons riding on guide rails at either side. Once the hull is on bottom, the pontoons are submerged and imbedded in the mud by force of hydraulic rams.

Several innovations are included in mechanism of the pontoons. A C-shaped shoe connects them to the guide rail.

Design of the attachment frame uses a floating hinge. It insures a 4-point contact against the guide rail. A horizontal slide permits the barge to incline a maximum of 6° with respect to the pontoons.



The hydraulic rams gain new efficiency through self-contained hydraulically operated locking bolts. They may be engaged with the guide rail while the ram "takes a new bite."

Other details of the platform: Superstructure is 175 ft. long by 54 ft. wide; the hull measures 142 ft. by 69 ft. with depth of 13½ ft.; pontoons are 146 ft. by 11 ft.; and the deck is 55 ft. above base line of the hull.

U.S. Ponders Sale

Industry polled on demand for more offshore leases

WASHINGTON.—The Interior Department put it up to the oil, gas, and sulfur industries last week to say whether they wanted another sale of leases on the outer continental shelf.

The Bureau of Land Management announced it would receive nominations of areas to be put up for bidding. Industry suggestions will be accepted until February 10.

The call will show if the three industries are sufficiently interested to warrant another sale, Director Edward Woozley said.

The bureau already has sold 235 leases totaling 864,437 acres on the outer continental shelf off Texas and Louisiana. So far the Government has received $252,141,077 in bonuses and first-year rentals.

The Government has an additional 20,500,000 acres of mapped submerged lands still to be leased. Early this month it released two new maps covering the area between Chandeleur Sound and Mexico.

The February nominations are to be filed with the New Orleans offices of the Bureau of Land Management and the oil and gas supervisor of the Geological Survey.

Plenty of Asphalt Available

NEW YORK. — The Asphalt Institute, here for its annual meeting, declared emphatically that the expected boom in paving asphalt will not result in any shortage. The 72 directors who represent over 80 per cent of asphalt capacity said their firms are geared to boost production to meet any challenge offered by a national highway program.

Two new companies joined the Institute, Sun Oil Co. of Philadelphia and Richfield Oil Corp. of Los Angeles. They bring membership to 53 companies operating in the U.S., Canada, United Kingdom, Belgium, and Sweden.

Sid Goldin, assistant to the vice president for marketing of Shell Oil Co., New York, was elected board chairman. He succeeds Hal B. Pullar, chairman of the board of Berry Asphalt Co., Chicago.

New divisional vice presidents include: T. R. Ellis, The Texas Co., New York; Floyd Reed, American Bitumuls & Asphalt Co., Cincinnati; Don Fox, Derby Refining Co., Wichita; Robert Ketchum, Anderson-Prichard Oil Co., Oklahoma City; and Don Nielson, Union Oil Co. of California, Los Angeles.

Truckers Fight Cut

Rehearing sought on Railroad Commission order; it tries to equalize tariffs for oil-field pipe hauls from Houston

AUSTIN.—Texas oil field haulers are making final efforts to stall an average 10 per cent cut in the rates they get for moving oil field pipe.

Attorneys for the Oilfield Haulers Association last week prepared a motion for rehearing on the Texas Railroad Commission decision. They also are considering court action if the commission refuses another hearing.

This is how matters now stand in the year-long squabble over motor freight rates for pipe transportation. Lone Star Steel Co. has persuaded the commission to cut rates for 30,000-lb. intrastate shipments of iron or steel pipe. They were lowered to the same level as interstate material transhipped from Houston to all Texas points.

Lone Star argues that Texas-made pipe at its mill is penalized. Competing pipe barged to Houston from the Midwest can be shipped more cheaply than pipe from Lone Star.

The commission, in a unanimous decision, ordered the lowered rates effective December 20. Reductions range from 17 per cent for a 5-mile haul to 7 per cent on a maximum-distance haul.

The truckers' side . . . Truckers are protesting. They claim the action goes farther than applying to shipments from Lone Star and Orange, the two Texas fabricating points outside Houston.

The rates also affect shipments within any oil field, where pickup and delivery conditions are much more costly than hauling from the Lone Star plant to a supply house pipe yard.

The haulers may offer a compromise plan to the commission. Under it the lower rates will apply to plant shipments from Orange, Lone Star, and Houston. Other pipe hauling, in the field or elsewhere, will remain at the old intrastate rates.

All rates under fire . . . The freight rate situation on oil country pipe is being attacked on several fronts because of a peculiar set of rates.

Oil field pipe is now shipped in Texas under three sets of rates:

. . . Houston to-all-points in Texas interstate rate—the lowest.

. . . Interstate rates from points in Texas other than Houston—7 per cent higher.

. . . Intrastate rates on hauls between any points in Texas—highest of all.

The commission decision sets the lowest interstate rates as the intrastate tariff.

But oil field haulers already have had a hearing before the Interstate Commerce Commission in Houston on a motion to increase the Houston to-all-points interstate rates.

A hearing also is scheduled for February in St. Louis on a proposed increase in the railroad interstate rates on pipe. Another hearing will be held by the ICC January 23 in Houston on a motion to increase interstate rates on hauls coming into Texas at points other than Houston.

State Wins Round

Louisiana permitted to quiz departing official

WASHINGTON.—The Supreme Court has given Louisiana permission to take a deposition in a tidelands suit which hasn't even been filed.

The deposition will be made by James P. Morgan, Louisiana State University geologist, who has made extensive studies of the state's coast line and geographical claims.

Morgan's statement will be used in a suit to test Louisiana's claim to a 3-league boundary in the Gulf of Mexico. Louisiana Atty. Gen. Fred S. LeBlanc told the court earlier this month that state authorities have been advised by the Justice Department that that suit will be filed. He said the deposition must be taken immediately because Morgan soon will leave for a 1-year stay in Pakistan.

The Justice Department opposed LeBlanc's motion. It indicated it has no immediate plan to file a suit.

Solicitor General Simon E. Sobeloff said taking the deposition on such short notice would work a hardship on Government lawyers. They would be required to cross-examine Morgan. And even if the deposition is taken, he said, the Government will oppose its admission as irrelevant and immaterial.

Deep-Water Well Completed

NEW ORLEANS.—The CATC Group has completed its offshore oil discovery in 97 ft. of water, the deepest ever drilled in the Gulf of Mexico.

The strike, designated State Lease 953 Unit No. A-1, is in Block 47, Grand Isle area, about 18 miles off the coast of Jefferson Parish, Louisiana. It is about 15 miles south of nearest production.

Drilled to 13,620 ft., the test was dually completed at 9,868-74 and 13,614-20 ft. The well flowed 33°-gravity crude at the rate of 348 bbl. daily from the upper zone and 37°-gravity oil at the daily rate of 410 bbl. from the lower zone. Test was through 10/64-in. choke.

Depletion Debated

Subcommittee hears views of oil men and professors

WASHINGTON.—The oil industry's depletion allowance was attacked and defended last week by members of a special panel set up last spring by the congressional joint economic committee.

The seven panelists debated the issue before a subcommittee headed by Rep. Wilbur D. Mills of Arkansas. The four businessmen and three college professors expanded the views expressed in papers submitted earlier and released by the subcommittee last month *(The Oil and Gas Journal, November 21, page 127)*.

The debate ranged from a theoretic calculation by Prof. Arnold Harberger of the University of Chicago that it takes $3 billion of capital to find $2 billion worth of oil to a warning by Lowell Stanley of the Monterey Oil Co. that without depletion most independent operators would be forced to sell their properties.

Horace M. Gray of the University of Illinois charged the allowance has "degenerated" into a subsidy of benefit chiefly to a few large corporations.

But Scott C. Lambert of Standard Oil Co. of California charged that critics of depletion were "obscuring" its importance to the future of both the nation and the oil industry.

Lambert warned against a change in the allowance without full knowledge of its effects.

Offshore Insurance Higher

AUSTIN.—The Texas Board of Insurance Commissioners has set rates for workmen's compensation insurance on offshore-drilling operations at levels 50 per cent above those on shore. The new rates apply for all policies, new or renewals, taking effect after December 15.

J. Byron Saunders, casualty commissioner, said the board plans to call a conference soon of insurors, employers, and others interested in offshore operations to discuss all factors involved in offshore coverage.

BROWN & ROOT used 9,000 barrels in big pipeline shove in Louisiana.

Pipe Laid in 12-Mile Section

CAMERON, La.—One of the longest pipeline shoves ever made—involving nearly 12 miles of 16-in. pipe—has just been completed through the marshes of southern Louisiana.

The entire string of pipe was welded together at one site, then floated forward through a narrow canal in swampy country near here.

The big push, believed to be the longest ever undertaken in one operation, was made by Brown & Root, Inc., in laying a portion of line for American Louisiana Pipe Line Co.

Ed Minor, pipeline manager for Brown & Root, said the 62,105-ft. shove was necessary because permission could not be obtained from the landowners to dig a flotation canal. Since the surrounding terrain is too marshy for use of land equipment, Brown & Root decided to dig a smaller canal and use the "shove" technique, frequently used in shorter water crossings.

Nine thousand empty oil drums floated the 16-in. concrete-coated pipe through the channel. As many as seven drums were attached to each joint of pipe. As a joint was added, the entire string was pushed forward.

Total weight of the floating line was estimated at 12,421,000 lb.

Marsh buggies were the only vehicles capable of maneuvering in the water-logged terrain. Draglines mounted on these vehicles were used in digging the ditch ahead of the pipe. The vehicles also helped guide the lead end of the long string.

Laying the 12-mile section involved winding the pipe around two long

curves in the canal. A two-way radio maintained contact between the marsh buggies and the pusher at the rear end of the floating pipe.

The 12-mile string is part of a 38-mile section of pipe being laid for American Louisiana by the Houston contractors. The American Louisiana project will extend more than 1,100 miles from North Tepetate, La., to near Detroit.

Industry Briefs

DENVER. — Stockholders of Kinney-Coastal Oil Co., Denver, have rejected a proposal to transfer assets of the firm to Ohio Oil Co. J. W. Shireman, vice president of Kinney-Coastal, said no further effort will be made to ratify the management proposal. Kinney-Coastal had proposed an exchange of 17½ shares of the firm's stock for one share of Ohio Stock.

WASHINGTON.—The FPC has set hearings January 23 on a proposal by Northern Natural Gas Co. to build 654 miles of pipeline in Minnesota, Wisconsin, South Dakota, and Iowa. Facilities, costing $27,084,500, will increase the system's capacity by 93,789 M.c.f. daily. Application covers Wisconsin area already disputed by Midwestern Gas Transmission Co. and Michigan-Wisconsin Pipe Line Co.

ANDREWS, Tex. — Magnolia Pipe Line Co. has started work on a new gathering system in Andrews County, West Texas, to handle sour crude produced in the McFarland-Queen sand and Nolley-Queen sand fields. The company will lay 14 miles of 8-in., plus 4, 6, and 8-in. feeder lines. The 8-in. line will run from the fields to Magnolia's Andrews station. Crude produced in the area currently is trucked to the pump station.

BAKERSFIELD. — Tide Water Associated Oil Co. has completed putting 600 low-gravity oil wells back on production in the Kern River field near here. The wells add 3,500 bbl. of heavy crude to the state's daily production.

VANCOUVER. — Charter Oil Co., Ltd., is buying a "substantial interest" in Magna Pipe Lines Co., according to R. K. Farris, Charter president. Magna recently got approval to buy gas from Westcoast Transmission Co. at the border and carry it to a big Vancouver Island market.

FORT ST. JOHN, B. C.—Westcoast Transmission Co. has let a $1,000,000 contract for clearing right-of-way on its 650-mile natural-gas pipeline from the Peace River fields to Tommy Wilde, of Fort St. John. Wilde will use 500 men to clear 120 miles of route for the $142,000,000 line.

CALGARY. — Alberta Gas Trunk Line Co., Ltd., is moving forward in steps to option right-of-way for its first year construction program. President Ralph Will recently told stockholders that the company is ready to buy the necessary pipe and equipment.

Here's the World's Biggest Steel Tank

LETTER, Tex.—There's a lot of aqua ammonia in this big tank—323,000 bbl. when it's full.

That makes it the biggest steel storage tank in the world.

The huge facility was built for Phillips Chemical Co. at its Cactus plant near here. The job was done by General American Transportation Corp. Measuring 220 ft. across and 48 ft. high, the tank covers almost an acre of ground. The men on top are mere fly specks.

More than 1,100 tons of steel went into the construction. The bottom ring is 1½ in. thick. Seams were welded together by automatic welding machines. Here's some idea of its size: By pumping at the rate of 25,000 bbl. per day, it would take almost 2 weeks to fill the tank with water.

By storing the ammonia in solution, the steel tank can be used rather than the more expensive spherical storage required for gaseous ammonia under pressure. Phillips built the tank to provide customers adequate fertilizer supplies for the spring and fall seasons.

Pipeline may expand again . . .

. . . El Paso Deals for Refinery

EL PASO, Tex.—El Paso Natural Gas Co. is moving to expand operations further into the refining and marketing ends of the oil business.

The big natural-gas pipeline firm confirms it is negotiating with Malco Refineries, Inc., to buy a 2,500-bbl. refinery at Prewitt, N. M.

El Paso recently acquired all assets of McNutt Oil & Refining Co. They include a 3,200-bbl. refinery at Brickland, N. M., seven product terminals, and 125 retail outlets *(The Oil and Gas Journal, October 24, page 59)*.

This deal was termed by Paul Kayser, El Paso president, a first step in a long-range program aimed at finding the best market for the company's 25,000-bbl. daily of natural gasoline, butane, propane, and other liquids.

The company has hinted that it eventually plans to refine and market on its own virtually all of this gas-liquids production. Purchase of the Prewitt plant, expected sometime this month, is a move in this direction.

Malco is buying and processing substantial volumes of El Paso liquids from its San Juan basin plants. The Prewitt operation would be little affected by the change of ownership.

Along with its 2,500-bbl. of still capacity, the Prewitt refinery has a 1,000-bbl. thermal cracking unit, a 1,000-bbl. catalytic reformer of the type licensed by Atlantic Refining Co., and a 65-bbl. cat polymerization plant.

Cat reforming hinted . . . El Paso so far has not revealed how it will process the gas liquids.

Observers think it probable, however, that the company intends to employ catalytic reforming on a large scale to convert the gas liquids directly into motor fuel rather than to use them only in conventional blending operations.

It is known that the company is blueprinting a comprehensive expansion of the Brickland refinery it acquired in the McNutt deal. Some engineering work has been done already. Actual construction probably is about 1 year off. The units involved haven't been announced.

Malco, if it sells the Prewitt plant to El Paso, will expand its Artesia, N. M., refinery. The company also is considering building products pipeline from Artesia to El Paso, Tex.

Gas Line Planned

● Two California utilities plan to increase imports of gas to 890,000 M.c.f. daily

LOS ANGELES.—Two more California utilities have announced plans to build a second big-inch pipeline to step up their imports of natural gas into the state.

Southern California Gas Co. and Southern Counties Gas Co. have filed petition for the new line with California Public Utilities Commission. They plan a 236-mile, 30-in. pipeline from Topock, Ariz., to Newhall, Calif. The firms presently operate a 30-in. line from Blythe on the Arizona border to Santa Fe Springs.

Their application followed approval by the Federal Power Commission of plans by Pacific Northwest Pipeline Corp. to import Canadian gas. This will permit Pacific Northwest to release supplies in the San Juan basin to El Paso Natural Gas Co., who in turn will serve California distributors *(The Oil and Gas Journal, December 5, page 72)*.

Southern California Gas and Southern Counties Gas will take delivery from El Paso Natural at Topock and move the gas to Newhall. From there they plan to build a 41-mile, 30-in. feeder to Alhambra for distribution to metropolitan Los Angeles. This line, is not covered by the application.

Cost of both pipelines is estimated at $30,750,000. They will bring an additional 177,000 M.c.f. of gas daily to their 2,000,000 customers. The new gas will raise the companies' imports to 890,000 M.c.f. daily.

Work on the project will start early next year if approval is granted. Completion date is 1959.

Pacific Gas & Electric Co. is planning a similar project to increase its supplies for northern California markets. Last month it filed a request with the state commission for a 150-mile, 34-in. pipeline from Topock to Milpitas, Calif. The project would mean parallel sections for all of P.G.&E.'s 570-mile line except for a 70-mile segment. The added pipeline capacity would increase the utility's imports from 700,000 M.c.f. daily to 875,000 M.c.f.

Jersey Wins Point

Trial of $36 million suit against firm can go ahead

NEW YORK. — The Government's $36 million suit alleging Standard Oil Co. (N.J.) charged too much for oil imported to Europe under the foreign aid program is a step closer to a decision.

And the latest round goes to Jersey and a subsidiary, Esso Export Corp.

A federal judge rejected the United States' contention that a New York law firm should not be permitted to represent the oil companies on grounds a member has confidential knowledge of the Government's case.

The entire lawsuit has bogged down over the ethical-legal question of whether Sullivan & Cromwell should be allowed to defend Esso Export and Jersey. Garfield Horn, a partner in the firm, is a former attorney for the U. S. Economic Cooperation Administration. The U. S. charged Horn received confidential government information relating to the case while with the E.C.A.'s Paris office. He denied the charges.

Judge Irving R. Kaufman ruled that the Government failed to prove its contention.

What the suit involves . . . The Government is suing Jersey Standard for $35,862,288.

It claims the company overcharged European importers of Middle East oil this amount between 1948 and 1952. The oil was shipped to countries participating in the Marshall Plan. Purchases were financed by the E.C.A.

The U. S. claims Jersey charged prices above maximums set up by the E.C.A. Jersey denies this and contends E.C.A.'s regulations were invalid anyway.

Right-of-Way Rules Set

WASHINGTON. — Rules for the granting of rights-of-way for pipelines in the outer Continental Shelf were laid down last week by the Interior Department.

The regulations meet a need created by Offshore Gathering Corp., which plans two pipelines along the Texas and Louisiana coasts. One will be for oil and the other for natural gas *(The Oil and Gas Journal, November 28, page 60)*.

Rights-of-way not exceeding 200 ft. in width will be issued for pipelines and areas "reasonably necessary" for pumping stations or other accessory structures. The easement will not include gathering lines and structures built for the purpose of moving production for gathering, storage, or treatment from leases.

No special form will be required, but applications for rights-of-way must be accompanied by a $10 filing fee. Annual rental will be $5 per mile or fraction thereof of pipeline and $50 for each area for a pumping station or other accessory.

842-Mile Line Near Finish

LOS ANGELES. — An American railroad's unique venture into the product pipeline business is almost a reality.

Less than 15 miles remained unbuilt of Southern Pacific Pipe Line Co.'s 842-mile system that will carry motor fuels, aviation gas, diesel, and jet fuels from El Paso and Los Angeles to Phoenix and Tucson.

A 1-mile stretch is being laid near Tucson and a 5-mile section near Yuma, Ariz. The $30,000,000 line, which parallels the railroad's main right-of-way, ranges from 10 to 16 in. The company plans to begin operation early next month *(The Oil and Gas Journal, September 26, page 132)*.

Gas Network Planned

HOUSTON.—North Carolina Natural Gas Corp. has announced it will build a network of natural-gas lines within North Carolina.

The firm, a subsidiary of Colonial Natural Gas Corp. (formerly Texas Ohio Gas Co.), has received permission from the North Carolina Utilities Commission to build the lines.

P. McDonald Biddison, president of the company, said that 575 miles of 3 to 16-in. line will be laid.

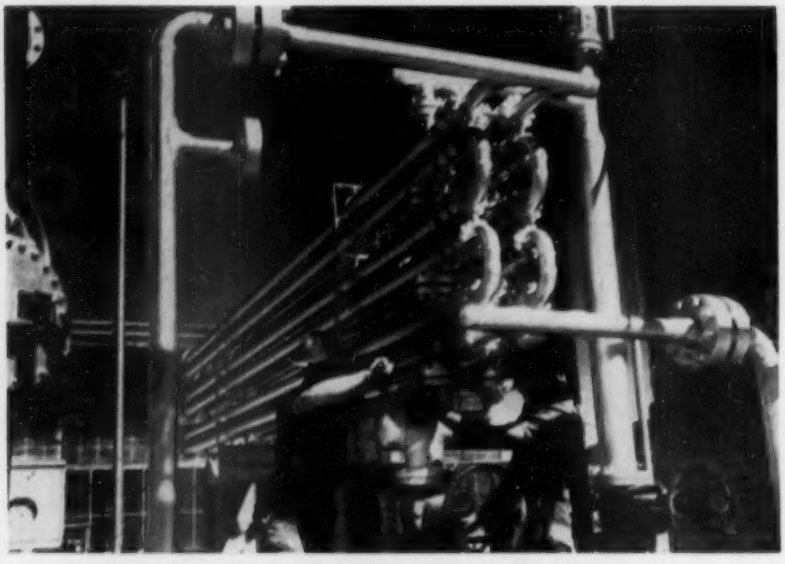
King-Sized Cat Cracker Taking Shape

DELAWARE CITY, Del. — The world's biggest cat cracker is going up here at the 130,000-bbl. daily refinery of Tide Water Associated Oil Co.

The Orthoflow fluid unit will process 102,000 bbl. daily. About half will be fresh feed, half recycle. The unit is one of six catalytic processes in the new refinery, designed for the maximum yield of high-octane gasoline.

The main column is the converter, which will tower 250 ft. in the air. The heavy prefabricated steel sections, weighing several tons, are hoisted into place by the 245-ft. guy derricks.

Construction also is in progress on seven business buildings. There will be two laboratories, plus buildings for administration, industrial relations, pilot experiments, a firehouse, and a "change" house. This area will cover the equivalent of 185 city blocks.



NEALE FIELD plant in Louisiana where Atlantic will prove . . .

In high-pressure gas injection . . .

. . . First Success No Fluke

DALLAS.—Atlantic Refining Co., a pioneer in the high-pressure gas injection process for increasing oil recovery, will kick off its second project soon.

The new undertaking will be in the 10,400-ft. sand in Neale field, Beauregard Parish, Louisiana. Though much smaller, it will resemble closely Atlantic's Block 31 Devonian operation—the company's first test of the high-pressure process.

The Neale reservoir is located on an anticline. Reservoir drive is solution gas, and the fluid was found to be particularly susceptible to the high-pressure process. The company estimates recovery will be more than 50 per cent of that originally in place.

Dry gas for injection will come from the Neale field natural-gasoline plant. It will be cooled and compressed at the plant and pumped into the 10,400-ft. sand initially at a bottom-hole pressure of 5,300 psi. This input pressure will be maintained until the present reservoir pressure of 3,700 psi. is boosted to the original 4,300 psi.

Three wells formerly producing from other Neale reservoirs will be converted to input service. There are five producers planned now with more possibly to be added later.

Atlantic plans to inject a total of about 2,000,000 to 2,500,000 cu. ft. of gas a day through the three inputs until the sand is repressured. Input volume then will be pared back to about 1,500,000 to 2,000,000 cu. ft. a day.

How it works . . . Atlantic recently was issued two United States patents covering the process.

Generally, the technique works best in undersaturated reservoirs with bottom-hole pressures in excess of 3,000 psi. The required pressure varies somewhat with temperature and gas-oil ratio of a reservoir but more according to the amount of intermediates (natural gasoline and L.P.G. components) in the oil.

High-pressure gas injection ordinarily will not sweep as big a portion of a reservoir as water. But it will recover much more oil from the area swept. The process also is cheaper since fewer input wells are required.

In effect, the oil is washed out of the reservoir as if by kerosine or some other solvent. The high-pressure dry gas when entering the producing formation passes over a residual oil and is enriched. It thus achieves a high degree of solubility in the virgin reservoir oil. As the enriched gas moves forward, it creates a bank of swollen liquid. This is light in gravity and approaches the viscosity of the virgin reservoir oil.

The swollen liquid bank, in what Atlantic calls the transition zone, displaces the virgin reservoir oil, which is produced.

Successful pioneer . . . Atlantic's Block 31 project in Crane County, West Texas, keeps looking better all the time.

This project has been expanded three times and now takes in more than 6,000 acres. The experiment was started in June 1949 with one input well. Now there are 15.

Daily oil production from the 8,000-ft. Devonian was running about 3,600 bbl. daily at the start. Recently the Texas Railroad Commission approved an increase in allowable for the Devonian pay from 13,500 to a new total of 15,350 bbl. a day.

The middle Devonian formation, into which the gas is being injected, got nearly all the increase—from about 12,000 to about 13,800 bbl. daily.

Atlantic, in order to produce the higher allowable, has increased injection volumes from about 31,600,000 cu. ft. to about 37,000,000 cu. ft. a day. This includes all produced gas plus make-up gas purchased from El Paso Natural Gas Co.

Added compressors have been installed at the injection plant, raising total compressor horsepower from 7,700 to 9,500.

Atlantic engineers so far have found no evidence of gas channeling.

Gas Ruling Delayed

Natural Gas Pipeline case won't be settled till May

WASHINGTON.—The dispute over who should sell gas to Natural Gas Pipeline Co. of America is expected to drag on for another 6 months before the issue is decided.

Now that the Federal Power Commission has consolidated opposing applications, the lengthy process of filing briefs and conducting oral arguments before an examiner must be repeated. Final briefs aren't scheduled until January 4 and the examiner's decision, which doubtless will be appealed, is not expected before that date. So principals in the case don't look for a ruling before next May.

Natural, faced with steadily dwindling supplies, tossed a bombshell among North Texas buyers with its bid to up the price of gas in Wise and Jack counties. The company proposed to lay a pipeline from its existing system in the Texas Panhandle to North Texas and pay 15 cents a M.c.f. for gas, 4 cents more than the going rate. *(The Oil and Gas Journal, August 8, page 78).*

Lone Star Gas Co., chief buyer in the area, countered with its own pipeline plan, claiming the increase would add $13,000,000 a year to its operating costs. Other companies protested for similar reasons.

Atom Tanker Next

Bids asked on test ship; its fate up to Congress

WASHINGTON.—The world's first atom-powered tanker may be afloat within 4 years.

The Maritime Administration will open bids for construction of the vessel next month. But whether the ship ever gets beyond the drafting board will depend on the willingness of Congress to provide the money for it.

The tanker is one of two projects started by the Maritime Administration. The other is a study of the economics of nuclear propulsion systems. Invitations to bid on these projects have been sent to 25 companies.

Bidders are asked to set a fixed price for the design, manufacture, installation and test of a 20,000 shaft-horsepower nuclear reactor and associated machinery in a 36,000 deadweight ton merchant tanker. Delivery date is June 30, 1959.

The general design of a suitable tanker has been worked out, but a specific hull is yet to be designed for installation of the nuclear propulsion system.

A Maritime Administration spokesman explained a tanker has been chosen for the nuclear study because of the economic advantage offered.

A tanker operating on atomic power can immediately convert its bunker space into usable cargo space, in effect increasing the delivery capacity of the vessel by thousands of tons.

The proposals offered next month will give the agency basic information on which it can go to Congress with a request for approval of the project and funds to carry it out.

Pipeline May Change Hands

DENVER. — Handridge Oil Co., Denver, operator of a crude line in Wyoming, may merge with United Dye & Chemical Corp., New York.

Directors of both companies have approved the deal. It now must be approved by stockholders of United Dye & Chemical. Details of the merger agreement were not disclosed.

Handridge is a subsidiary of Garfield & Pasternack, Denver independents. The firm purchased Plains Pipe Line Co. from the Franklin County Coal Co., Newcastle, Wyo., a holding of the Murchison interests, last August.

The pipeline has a daily capacity of 38,000 bbl. of crude. It extends about 100 miles from the Lance Creek field in Weston and Niobrara counties, Wyoming, to connect with other pipelines serving the Midwest.

Coastal Test Hits

Deep Mississippi wildcat finds strong shows of gas

GULFPORT, Miss.—Significant indications of gas-condensate production were encountered last week in a deep, rank wildcat test 25 miles southwest of here in the southwest corner of Mississippi's coastal Hancock County.

The test is Marshall Young's 1 Cuevas heirs, being drilled on a Sun Oil Co. farmout. Location is only 3 miles inland from the Mississippi Sound-Lake Borgne shoreline. It is less than 5 miles from the Louisiana line (Pearl River) and about 25 miles northeast of New Orleans.

Geologically, it is on the southeast flank of Wiggins Anticline, a major structural feature extending in an east-west direction through the state's extreme southern counties.

Nearest Mississippi production is in the Maxie-Pistol Ridge area, in Forrest and northern Pearl River counties, nearly 50 miles northeast. In coastal Louisiana, nearest production is in a small isolated field 15 miles southwest, in Lake Borgne.

Production indications were in the Lower Cretaceous Washita-Fredericksburg section at depths below 10,776 ft. Gas showings were evident while drilling from that depth to 10,836 ft. Hole then was cored from 10,789-837 ft., recovering 18 ft. of tight sand, 2½ ft. of dark shale, 23½ ft. of limestone, and 6 ft. of sand, all showing strongly of gas.

A 12-minute drill-stem test was taken of the latter interval with ¼-in. top and bottom chokes, and using a 3,600-ft. water cushion. When coming out of the hole, with 4,050 ft. of pipe out, the well unloaded the water cushion. Maximum top pressure gaged 3,600 psi. Bottom-hole pressure ranged from 1,975 to 2,025 psi. flowing, and 5,050 psi. shut in. Hole is being cored ahead.

If commercial production is opened, it not only will be the first in Hancock County, but also in any of the state's three little-explored coastal counties. Also, it will be the first in the state from the Washita-Fredericksburg section. Other Lower Cretaceous production in southeastern states is from lower zones. Nearest production in Louisiana is from stratigraphically shallower and younger Miocene sands. Nearest equivalent Washita-Fredericksburg production (Buda and Georgetown lime) is in East Texas.

Patent Suit Ends

Socony, Houdry settle big process fight out of court

PHILADELPHIA. — Socony Mobil Oil Co., Inc., and Houdry Process Corp. have settled out of court a multi-million-dollar patent suit originally filed by Houdry in March 1953.

The settlement carried three points:

. . . **The two firms agreed** to exchange immunities in the field of moving-bed catalytic cracking.

This includes the Houdresid technique for their own operations and for their licensees. And it frees both to receive, use, and pass on to licensees technical information and know-how owned or controlled before the year's end by either company.

. . . **They will grant** to each other, for themselves and the present and future licensees of each, an irrevocable nonexclusive royalty-free immunity under patent rights for "certain inventions" in the field of moving bed cat cracking during a 5-year period starting January 1.

. . . **Socony agreed to pay** Houdry $3,000,000 for acquiring certain patent rights and to settle patent claims.

Houdry also will receive from Socony $12.50 per bbl. for any new Thermofor cat cracking capacity Socony builds during the next 5 years.

Washington Wildcat Planned

SAN FRANCISCO. — Standard Oil Co. of California plans to drill a wildcat on the Olympic Peninsula in the state of Washington 2 miles north of Sequim.

Drilling of the Dungeness Unit 1 is expected to start after the first of the year.

It will be the third exploratory project undertaken by Standard in the Pacific Northwest this year. The company earlier drilled two unsuccessful wells, one near Astoria, Ore., and the other near Prineville, Ore.

Dungeness 1 will be Standard's eighth attempt to find oil in Washington. The firm's first wildcat in the state was near Moclips in 1920.

Venezuela refinery to use gas . . .

. . . Fuel Oil Is Freed for Export

ROYAL DUTCH - SHELL'S Venezuelan affiliate plans to spend $42 million on two major construction projects. Both are designed to boost supplies of fuel oil for the export market and for Shell's long-term commitment to Great Britain.

Cia. Shell de Venezuela's first project is a 177-mile, 20-in. natural-gas pipeline connecting La Paz field in the Maracaibo district with the Cardon refinery on Paraguana Peninsula. The line will have a capacity of 106 million cubic feet daily. Its cost is estimated at $21,000,000.

The gas will be used as the chief fuel in the refinery's furnaces. This will permit economic use of natural gas produced along with crude oil. Another advantage: Fuel oil previously consumed at the refinery will become available for export.

Pipe delivery will begin early next year. The line is expected to go into operation in 1957.

Booming refinery . . . Shell's second project is construction of a fourth distillation unit at its Cardon refinery.

The capacity of the unit will be 80,000 bbl. daily. It will boost the over-all refinery capacity to 245,000 bbl. daily. Cost of the distillation unit will be about $20,300,000. The unit will be built in addition to cat cracking and alkylation plants now under construction.

Shell is the second largest crude producer in Venezuela, accounting for about 28 per cent of total production. Its output this year has averaged around 600,000 bbl. daily. The Cardon refinery, already the largest in Venezuela, is itself comparatively new. It was built after World War II and new extensions have been added continuously.

Pipeline network grows . . . Shell brings crude to Cardon from the Maracaibo area by a 160-mile, 30-in. line which begins at the Palmarejo terminal on the west side of Lake Maracaibo. Known as "Lightline," the carrier has a capacity of about 290,000 bbl. daily. Texas Petroleum Co. and Mene Grande Oil Co. hold minority interests in the line and deliveries are made at Las Piedras shipping terminal as well as at Cardon.

This year, Shell opened a 45-mile crude pipeline connecting lake production with Palmarejo. Called the "Lapline," the $9,700,000 facility has a rated capacity of 100,000 bbl. daily.

The only other long distance pipelines in this region are twin 26-in. lines built by Creole Petroleum Corp. The lines carry Maracaibo production to the Amuay refinery a few miles north of Cardon.

There's a big market . . . Shell's announcement of plans for heavy capital investments in Venezuela follow the world-wide surge in demand for heavy fuel oil.

One major contract negotiated recently, in which the Shell Group participated, was with the United Kingdom's Central Electricity Board. Under the agreement, Shell, Eagle Oil & Shipping Co., Ltd., and British Petroleum Co., Ltd., will supply increasing amounts of heavy fuel oil to the board, rising to 60,000 bbl. daily by 1960.

Sicilian Well Being Tested

Augusta Richerche Petrolifere, S.p.A. is testing a gas flow encountered at 4,700 ft. in Bronte 1, on the west flank of Mt. Aetna in Sicily.

ARPE, operating subsidiary of the partnership of Standard Oil Co. (N. J.) and Raffineria Siciliana Olii Minterali, encountered gas shows at various intervals in the lower 1,600 ft. of the well and has set casing to test shows obtained from alternate strata of sand and shale.

Bronte 1 is the second test drilled by the partnership in Sicily. The first, Melilli 1, is 7½ miles southwest of Augusta on Sicily's east coast. Last week the Melilli well was drilling below 8,500 ft.

A National 80 rig is being moved in for the third test slated by ARPE. It will set up near Vasadonna, about 20 kilometers from Catania in Mascalucia on the third exploration block held by the partnership under 3-year exploration licenses.

Refinery Proposed

Petrofina subsidiary may construct plant in Angola

THE Portuguese Government has announced that it is willing to authorize a refinery for Angola, West Africa.

Cia. de Combustiveis de Lobito, subsidiary of the Belgium company Petrofina, will build the plant. The Lobito firm holds exclusive exploration rights in Angola, and has signed a contract with the government for developing oil discovered there in April.

The Portuguese overseas minister said that a refinery of from 10,000 to 20,000 bbl. daily capacity would be approved. Construction would take around 2 years.

Reports from Lisbon earlier this year indicated that a plant would be built if sufficient crude production could be developed in Angola. But a refinery in the range specified by the minister might be economically sound regardless of domestic output.

The estimated consumption in Portuguese West Africa last year, the natural market for a refinery, was about 15,000 bbl. daily. The government might extend the same privileges to a refinery in Angola as it did to the Sacor refinery in Lisbon. This plant, in which the government holds one-third interest, has the right to supply up to 50 per cent of Portuguese demand.

The Angola discovery was located about 14 miles south of Luanda between Belas and Benfica. On initial tests, the well produced 300 bbl. daily of high-gravity, good-quality crude.

Petrofina is the operating company for Lobito, which obtained a 3-year renewable exploration concession in March 1953. The contract with the government for development of crude production calls for a capitalization of around $31,500,000. Fifty-five per cent of this sum is to be Portuguese capital.

Arab Tension Mounting

Saudi Government serves world notice it claims Buraimi; caravan of rifles is seized by Sultan of Muscat and Oman

TENSION over the undefined boundaries between Saudi Arabia and the small British-protected shaikhdoms in southern Arabia continues to mount. Last week the Saudi Government served public notice it regards the Buraimi Oasis as part of its territory.

The formal notice was issued in the United States by the Saudi embassy in Washington. It declared:

"The Saudi Arab Government hereby gives notice to all concerned that it regards the Buraimi Oasis as part of the Saudi Arab territory and that it will not recognize any concession for the production of petroleum and/or any other mineral or minerals or any concession whatsoever granted by any government or authority in said area.

"Any company or firm or person that enters into such an agreement will be doing so at its or his own risk and the Saudi Arab Government will regard such agreement null and void and will neither be bound by it nor responsible for any consequences."

The rather ominous notice was released the same day that news reports from Bahrain said forces of the Sultan of Muscat and Oman had "intercepted" seven Saudi Arabians with a consignment of 80 rifles at the edge of the Buraimi Oasis. The reports said the caravan had left Saudi Arabia in October and did not know that the Sultan's forces had taken over the oasis.

British-led troops of the Sultan ejected a Saudi Arabian force occupying the oasis late in October after two Saudis were wounded in the armed clash *(The Oil and Gas Journal, October 31, page 72)*. The action came after efforts to settle the old boundary dispute by arbitration broke down completely.

The dispute over boundaries has been going on for years. But possibility that the shifting sands of the area surrounding the oasis might contain oil has brought things to a head.

Petroleum Development, Ltd., a subsidiary of Iraq Petroleum Co., Ltd., has had a concession over much of the disputed area since 1937. The company is now drilling a test at Gezira in Abu Dhabi on the Trucial Coast. A test at Murban, 100 miles to the east, had oil shows, but was not commercial. The same company is drilling another well in the interior of Oman *(The Oil and Gas Journal, December 12, page 78)*. The disputed Buraimi Oasis lies between Muscat and Oman and Abu Dhabi.

Two major American oil companies, Standard Oil Co. (N.J.) and Socony Mobil Oil Co., Inc., are in a ticklish position with regard to the whole situation. The two companies share the 23.75 per cent American ownership of Iraq Petroleum. Jersey Standard owns 30 per cent and Socony 10 per cent of Arabian American Oil Co., which operates in Saudi Arabian territory.

Soviet influence spreading . . .

. . . Reds Step Up Competition

THE Soviet Union is taking more interest in the oil affairs of several countries on or near its borders.

One of these nations is India, where Russian technical men are currently studying the government-sponsored exploration program which calls for an expenditure of $17,850,000 in a 5-year search for oil. K. D. Malaviya, Indian minister of natural resources and scientific research, says the Russians will advise whether the program's present organizational setup can be improved.

He adds, however, that there are no plans for participation by the Russians in actual exploration for oil or other minerals. The Red experts are expected to complete their work in 3 or 4 months.

The Soviets are working independently of two Western oil companies carrying on exploration programs in which the Indian government has a 25 per cent interest. The firms are Standard-Vacuum Oil Co. and Assam Oil Co., Ltd., a Burmah Oil Co. subsidiary.

In Syria, the Soviets reportedly are offering to build a refinery at a lower cost than any other available source. The government has approved a $20,000,000 expenditure for a refinery at Banias, on the Mediterranean coast. The plant will process crude supplied by Iraq Petroleum Co., Ltd., which has a pipeline terminal at the city. A recent Syria-I.P.C. agreement recognizes the country's right to build the refinery. Soon afterwards, the Soviet ambassador made the offer to build the plant.

Russia also has negotiated a new trade agreement with Sweden which calls for increased shipments of fuel oil next year. The deal will increase Swedish imports to 15,000 bbl. daily from less than 11,000 bbl. daily. The oil is one of several items which Sweden will buy from the Soviets in exchange for industrial equipment, fishing boats, etc.

On the other side of the Eastern Hemisphere, Japanese trading firms are asking for special foreign exchange allocations to permit oil imports from Russia. The purpose of the requests is to promote barter trade.

On the political front, Russia apparently is trying to meddle in the Buraimi Oasis dispute. According to a Cairo report, the Soviets are offering material and moral support to Saudi Arabia. King Saud and Marshal Voroshilov, Supreme Soviet president, are believed to have exchanged messages on the issue.

Next Week . . .

. . . World-Wide Oil Report

The Oil and Gas Journal's year-end issue again will feature oil operations outside the United States and Canada.

Fifty-eight pages will present an area-by-area and country-by-country report of petroleum and natural-gas activity during 1955. Two pages will summarize important statistical data on foreign production, reserves, number of producing wells, and refining capacity. Two-color maps highlight this section.

Following this will be an array of feature articles dealing with important oil-producing countries.

This will be an issue every reader will want to file for reference throughout 1956.

Iranian Pipeline Begun

Products line should help solve transportation troubles which have cut down on domestic oil consumption in Iran

THE first construction project, a river crossing, has been completed on the 600-mile, 10-in. products line from Abadan to Teheran.

Originally planned by National Iranian Oil Co. to run from Ahwaz to Teheran, the project has been revised and expanded to include an 80-mile extension to Abadan. Ahwaz and Abadan are already connected to a 10-in. and a 6-in. line which will be reconditioned and in some areas completely replaced under the new program.

The project will relieve Iran's hard-pressed railway system which now transports petroleum products most of the way from the Abadan refinery to the capital at Teheran. The new line is being built in two stages. The first stage will give it a capacity of 20,000 bbl. daily. The second will double that capacity.

The first actual construction, crossing the Marun River ½ mile upstream from Ahwaz, was completed last week.

Pipeline contractors . . . Costain-John Brown, London, has the contract with N.I.O.C. to build the 300-mile southern section of the line. This portion will cross the Zedran Mountains at more than 6,500-ft. elevation. It will have four pumping stations.

Entrepose, of Paris, will build the northern 211 miles of the line with one pump station. This section of the line will reach elevations of 7,300 ft. The British and French-built sections of the pipeline will join at Azna, southwest of Teheran.

The originally announced 337-mile section contracted to the British firm and 236-mile section to be built by the French company have been shortened to 300 and 211 miles, respectively, by later surveys.

The engineering consulting firm, Rendel, Palmer & Tritton, London, has been retained by N.I.O.C. to represent the government oil company in connection with the line construction. A. Ittihadieh, N.I.O.C. director in charge of distribution, and A. Clifford Hartley and Harold Scutton, of the London consulting firm, just completed a tour of products pipeline systems in the United States.

Iran is one of the world's major producers, but transportation problems involved in getting products into the country's interior have curtailed domestic consumption. The pipeline to Teheran, with laterals to other areas to be built in the future, will help solve the problem.

The throughput of the line will be about 30 per cent middle distillates, 30 per cent kerosine, 20 per cent gasoline, and 20 per cent fuel or diesel oils.

Cuban Refinery Contracted

Procon, Inc., Des Plains, Ill., has the contract to design and build operating units for The Texas Co.'s 20,000-bbl. daily refinery at Santiago de Cuba.

The plant, first to be built in eastern Cuba, will have 20,000 bbl. of crude distillation capacity, a 3,300-bbl. catalytic reformer, a 4,100-bbl. hydrotreating unit, and a gasoline-sweetening unit.

The Texas Co. (West Indies, Inc.), Ltd., a Texaco subsidiary, expects to place the $14,000,000 refinery on stream early in 1957.

Russians Lay Line

180-mile leg completed on Caucasus-Moscow gas line

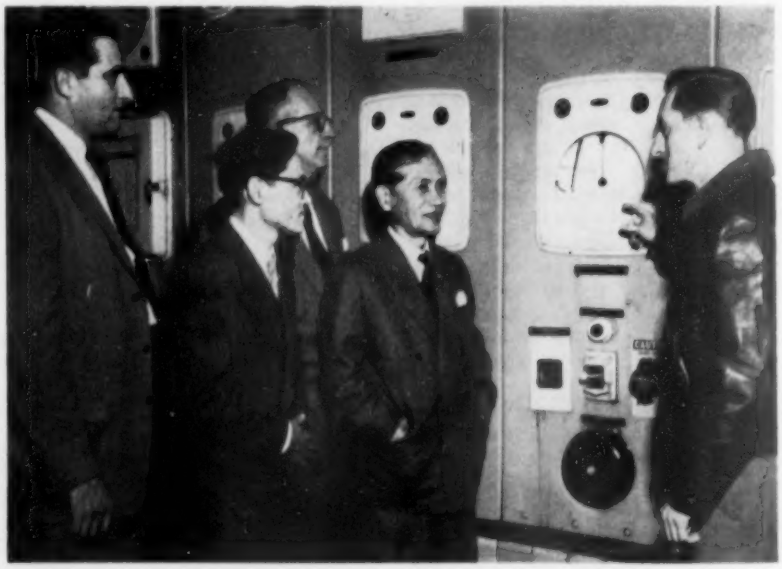
THE U.S.S.R. has finished the first section of a proposed 900-mile natural-gas pipeline from Stavropol, in the Northern Caucasus, to Moscow.

The completed section is 180 miles of 28-in. linking Stavropol and Rostov. When completed the line will serve other cities of Voroshilovgrad, Voronezh, Yelets, Tula, and Serpukhov, according to the Russian press.

Pipe on this line is much larger than any used before by Russia. Its two other major gas lines are of 16 and 18-in.

In contrast to practice on the older lines, work on the newer one is mostly by machine. An automatic electric welder is being used for triple jointing and actual pipe laying is with 130-ft. sections of pipe.

Methods of digging trenches and protection against corrosion are similar to those used by U. S. contractors, the Russians say. In the past, most of the job has been done by hand labor.



Tokyo Oil Man Visits U. S. Refinery

MITSUMASA KONDO, founder and present head of Toa Oil Co., Ltd., Tokyo, and his assistant, Kei Takagaki, are shown the control panel of a lubrication oil solvent extracting unit during a recent tour of Continental Oil Co.'s Ponca City, Okla., refinery.

Kondo, veteran of 45 years in Asian oil operations, is visiting the United States for the first time. He operated a 10,000-bbl. daily refinery in North China under the Nationalist regime. He lost it to the Communists.

Shown left to right are Paul E. Gieser, of Conoco's petrochemical group; Takagaki; R. L. Allbritain, who hosted the visitors; Kondo; and Bob Freele, assistant lube oil superintendent.

DIGGING THE RAT HOLE the driller uses the rotary table to drive the special drilling device. Note second draw-works drum which holds $\frac{7}{16}$-in. wire line for coring and swabbing.

NIPPLING UP includes hydraulic stripper blowout preventer as soon as surface conductor is set. Purpose is to prevent 500-ft. mine-gas blowout.

Deeper drilling beckons Illinois operators, and . . .

New Rigs Meet Changed Drilling Problems

For nearly 20 years, the Illinois basin has continuously yielded new oil to those who would drill for it . . . But new drilling areas present new problems that demand changes in conventional equipment and methods. Here's how one company has solved these problems by using new, highly portable rigs to cope with large-hole requirements.

by Frederick D. Furber
Breuer-Robison Drilling, Inc.

DEEPER drilling possibilities in the Illinois basin and hazardous lost circulation and blowout conditions in one area have prompted Breuer-Robison Drilling, Inc., to obtain two new specially designed rigs. The rigs are larger than most rigs now operating in the area and are much more flexible.

Features of these two rigs which are not commonly found on the average Illinois rig are: (1) a derrick to hold thribles; (2) a mud-boated substructure; (3) a shale shaker; (4) a hydraulic stripper blowout-preventer, 3,000 psi. (Regan); (5) rotary-drilling control-head (Guiberson)—suitable for dry drilling through coal mines with gas blowing out or for air drilling; (6) 6⅞-in. by 25-in. core barrel and 4¾ by 8⅝-in. diamond core head which eliminates reaming after coring; and (7) double-drum draw works with provisions for wire-line coring or swab testing.

Handling new problems . . . The rigs are designed for depths to 7,000 ft. with 4½-in. drill pipe. This is ideal for the deeper drilling possibilities of the Illinois basin. There is a 9,000-ft. hole now being drilled in Crittenden County, Kentucky, a part of the Illinois basin. This hole is much deeper than the average 3,000-ft. hole in the basin. It is also interesting because air and aerated mud are being used to drill it.

For one area of the basin, the especially important features of the rigs are substructures and blowout equipment. These are vitally needed for operations in Saline County, Illinois, because of shallow potential gas-blowouts. High-pressure gas is encountered in this area at about 1,000 to 3,000 ft. And at 400 to 500 ft., abandoned coal mines filled with methane gas are sometimes encountered. Mud circulation is lost to these mines and the ensuing gas blowout is extremely hazardous. Gas blowouts have caused three rigs to be burned up in this area.

Rig equipment . . . Both rigs are the new Cardwell Model J-450's, designed for slim-hole work in deeper areas, or for conventional 5,000 to 7,000-ft. drilling. They have been in operation less than 1 year. Lee C. Moore 127-ft. cantilever portable masts, mounted on a 10-ft. substructure, are used. Other equipment includes Emsco Model 350, 7 by 14-in. skid-mounted mud pumps, V-belt driven.

Power comes from two 300-hp. diesel engines driving through a torque converter and split-compounded to operate both pump and draw works. Pump and draw works clutches are operated by air from the driller's control panel and the draw works is equipped with a hydromatic brake.

Each rig is presently equipped with 3,500 ft. of 4½-in. A.P.I. 16.60-16 drill pipe and six 7¼-in. by 30-ft. drill col-

lars. Use of more than the usual two or three drill collars is aimed at increasing penetration rate with less wear on tool joints.

Faster drilling . . . Both rigs were equipped with 4½-in. drill pipe and 7¼-in. drill collars because it was decided to standardize on an 8¾-in. hole. Past experience has indicated a better penetration rate and fewer hole problems with 8¾-in. hole than with smaller holes in this area.

In Illinois basin drilling, the rate of penetration varies through fairly wide limits. These range from 1 to 3 minutes per foot for shales and water-bearing sandstones up to 30 minutes per foot in hard sandstones and cherty limestones. Rapid penetration and low-water-loss, lightweight mud are desirable because with them there is less trouble with heaving shales and also less invasion of producing formations.

With six drill collars, low-water-loss mud, and a shale shaker, good bit records have been attained and the mud-pump liners, tool joints, and drill pipe show little wear.

Time saved . . . Penetration rates are definitely higher than with the rigs formerly used, and a time saving of about 50 per cent has been effected by pulling thribles. In a pool in Clay County, where other rigs required 7 days under surface to 3,000 ft., the new rigs are making the same hole in 5 to 6 days.

The time saved in pulling thribles is reflected also in coring and drill-stem testing. It is estimated that a round trip to change a bit at 3,000 ft. is taking 1½ to 2 hours instead of the 3 hours required by Illinois rigs which pull doubles.

Coring and reaming . . . The original purpose of the double-drum draw works and 9/16-in. wire line on the rigs was for wire-line coring—a method hitherto untried in the Illinois basin. In Texas, Breuer-Robison has found the method to be economical and to give good recovery.

On the first attempt in coring limestone formations below 3,000 ft., the method proved quite satisfactory and recoveries greater than 75 per cent resulted. But on five later attempts on shallower sand formations (which now constitute the major oil-producing horizons), the wire-line coring method yielded less than 50 per cent recovery.

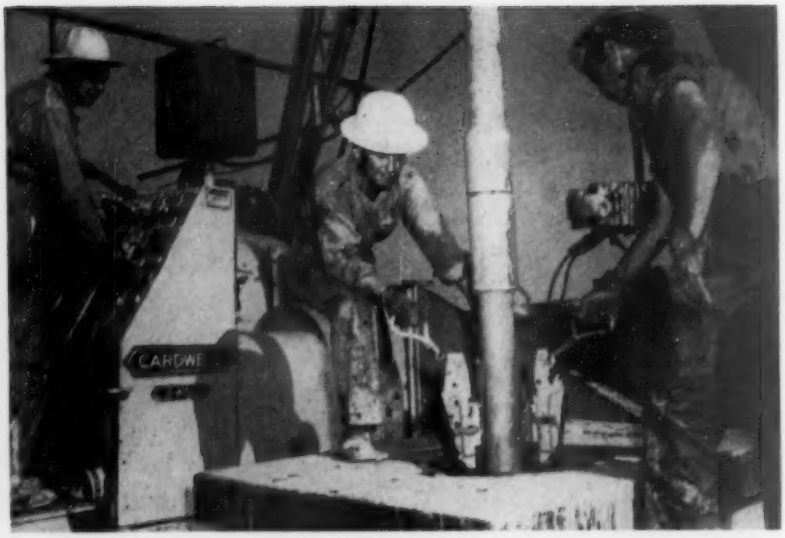
It was then decided to abandon the method in favor of a larger conventional diamond core. The 1¼ by 7¼-in. diamond wire-line coring bit and barrel were replaced by a 6⅞-in. by 25-ft. barrel and a 4¾ by 8⅝-in. diamond bit.

The 4¾ by 8⅝-in. bit has the great advantage of eliminating reaming with an 8¾-in. rotary bit. Past experience has shown that reaming the hard, sometimes sharp sandstones of Illinois often wears out a bit as badly as cutting a full-size hole. In some areas, particularly Saline County, it takes as much time to ream as it would to drill a full hole.

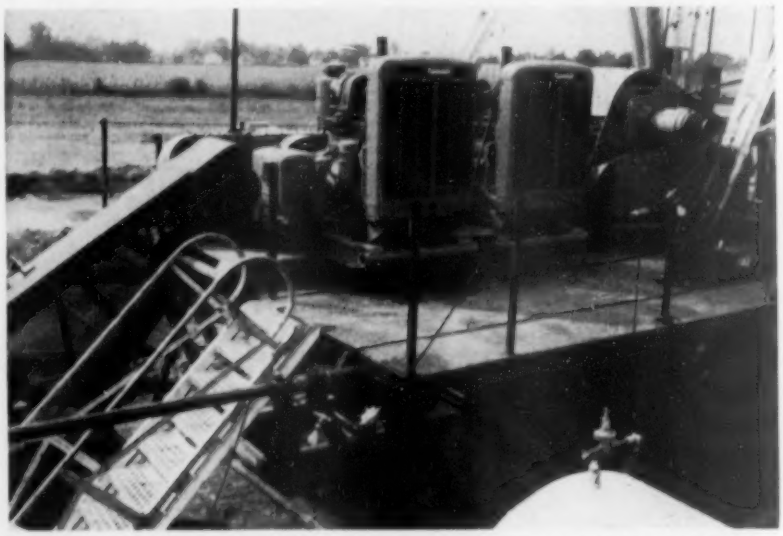
Opening old holes . . . A different approach was used recently by Breuer-Robison to test an old hole in Saline County. Knowing that invasion is a serious problem in Illinois, we have observed that drill-stem tests in old holes in untested zones may often be inconclusive. For this reason an experiment was tried.

The old hole was washed down to 200 ft. below the zone of interest and plugged back to the bottom of zone with cement. Then a soft-rubber packer was run and set on 4½-in. casing. The 4½-in. casing was then tested for 12 hours by the opening of the tester which allowed formation fluids to come to equilibrium. The casing was then swabbed for about 6 hours.

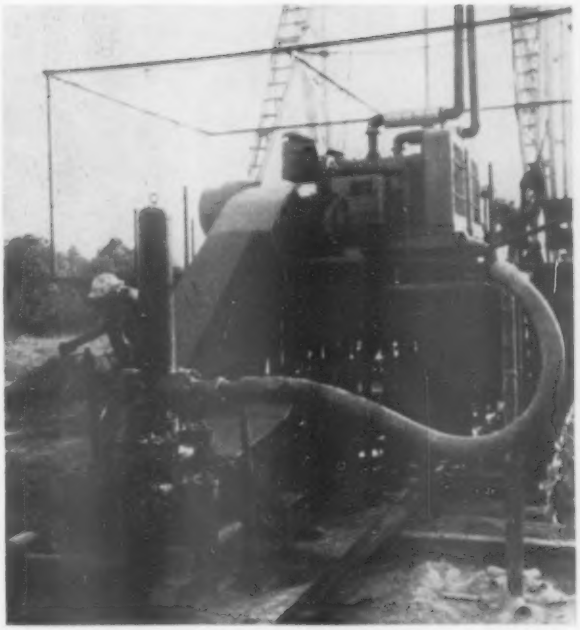
The result of the test was fresh water with flecks of oil followed by much salt water. Results, coupled with two other tests, resulted in the conclusive testing and abandonment of the well.



GOING IN THE HOLE the driller eases off on the brake of the draw works. Rig is heavier than most Illinois rigs, pulls thribles instead of doubles, and will be used for anticipated deeper drilling.



POWER PACKAGE of Breuer-Robison's new rigs provides a total of 600 hp. Diesel engines drive through a torque converter and are split-compounded to operate mud pump and draw works.



SINGLE MUD PUMP circulates mud through the 8¾-in. hole normally drilled. Six 7¼-in. drill collars have allowed faster drilling rate than usually obtained in the basin.

TOOL PUSHER reports on the well progress with one of the two new rigs. Moving the rigs, equipped with 127-ft. masts, requires 15 to 17 loads.

Swabbing on this test as well as on one rotary completion was accomplished by running a regular 4½-in. cable-tool casing swab on the 9/16-in. wire line of the new rigs.

Handling blowouts . . . Of 14 wells drilled and completed safely by Breuer-Robison in North Eldorado pool, Saline County, all were located over a supposed coal pillar in an abandoned coal mine. This mine was located about 450 ft. down and was filled with methane gas. Nine of the holes encountered a fractured coal pillar, circulation was lost, and a blowout ensued. Of these nine blowouts, eight were drilled, cased with 9⅝-in. to 500 ft., and cemented using substructure and blowout equipment. The other was drilled by a contractor.

Three rigs were destroyed by a mine-gas fire in this same pool because gas reached the engines as the hole was deepened below the coal.

THE AUTHOR

Frederick D. Furber is general manager, Breuer-Robison Drilling, Inc., Olney, Ill. He is a 1948 graduate of Washington University (St. Louis) with a B.S. in Chemical Engineering. His field experience included 5 years with Halliburton Oil Well Cementing Co. for whom he became assistant division engineer of the eastern division in 1951. He is a member of A.I.M.E., 1954.

Mine-gas control . . . Breuer-Robison decided on a program using a 10¾ by 4½-in. drilling control-head plus a 13⅜-in. hydraulic stripper blowout-preventer. As soon as loss of circulation and gas blowout occurs, the blowout preventer is closed on a 10¾ by 6-in. sub below the drilling control-head. Thus gas can be completely shut off while drilling continues.

Water is pumped down the drill pipe to cool and clean the bit. When hole is made, below the coal, drill pipe is stripped out of the hole through the preventer.

In changing over to run 9⅝-in. mine string, the driller first shuts off the motors on the rig. Then, by means of a winch line from a cat or pulling unit located 100 ft. from the rig floor, he hoists and lowers the first joint of casing. Once this joint (which contains the back-pressure float valve) is set on the slips the preventer can be closed on the 9⅝-in. and the gas is shut off.

After running two or three joints in this way, the driller releases the winch-line hoist and uses the rig engines to run the remainder of the casing.

For stripping drill pipe out of the hole through the blowout preventer, it has been necessary to fasten down the preventer with turnbuckles. Otherwise, the threads on the 13⅜-in. surface conductor to which the preventer has been coupled cannot withstand the drag of the pipe through the balloon-type stripper rubber.

Moving . . . One of the major operating problems in Illinois has always been moving. With larger rigs it is obvious that some mobility must be sacrificed in order to gain certain other features.

Illinois is characterized by varying terrain ranging from small hills and valleys difficult to negotiate with large equipment, to large flat plowed fields and timbered bottomlands. All areas are inclined to be very muddy during rainy spells. In the winter, freezing and thawing along with snow and rain often create very difficult rig moving conditions.

In spite of these conditions, Breuer-Robison has found that the chief problem to date with the larger rigs is the increased number of truck loads to be taken over the roads. Moving from one location to the next is much simpler. To enjoy the maximum advantage from these rigs, operation must be predicated on drilling pool prospects rather than wildcatting or single-well contracts.

Skids well in mud . . . On long moves over highways, 17 loads are required to move one of the rigs; on short moves over local roads, 15 loads. To go 660 ft. to the next location it has been found possible to skid the erected mast, motors, and draw works in one piece over dry or muddy ground. This can be done in 2 to 4 hours with four D-7 winch cats.

The rig—excepting mud pump, tool house, and doghouse—is skidded over dry ground with more drfficulty because of the greater friction against the "mud-boated" bottom of the substructure.

EFFECT OF SUBSIDENCE on oil-well pumping operations in Wilmington oil field. The ground level of the pumping wells on the left has been raised and that on the right is about

THROW OUT THE LIFE LINE . . .

Operators Eye Heroic Measures

Water injection and unit operation believed

by Frank G. Miller

SUSTAINED subsidence of the land surface of Wilmington oil field near Long Beach poses a serious threat to future developments and to property values in the vicinity of the field.

Overwhelming evidence points to fluid withdrawals from oil-productive zones and associated strata as the major cause of the surface sinking. Empirical mathematical relationships reveal that since 1947 the subsidence has been logarithmic function of the cumulative withdrawal of oil, net vacated space in the oil reservoir rock, and reservoir replacement volume.

This indicated relationship leads to the conclusion that surface settling could be effectively checked by coordinated water-injection operations. Such a program would offer the added benefit of substantially increasing the ultimate economic recovery of oil.

Since development was started at Wilmington in 1937, the surface has subsided to a maximum depth of 22 ft. The cavity created is shaped roughly like a large oval bowl, covering about 20 sq. miles. It is expected that the maximum depth will increase to about 35 ft. and that the area of the sunken land will increase markedly.

The sinking has caused extensive damage to port facilities, industrial plants, oil-production equipment, roadways, bridges, and other surface structures (see Fig. 1). Costs of reparation have amounted to many millions of dollars. Remedial work, however, has been done principally on a sporadic basis — when and where necessary. Notable exceptions are the relatively continuous projects of filling in sunken land and constructing and maintaining dikes to prevent inundation by sea water.

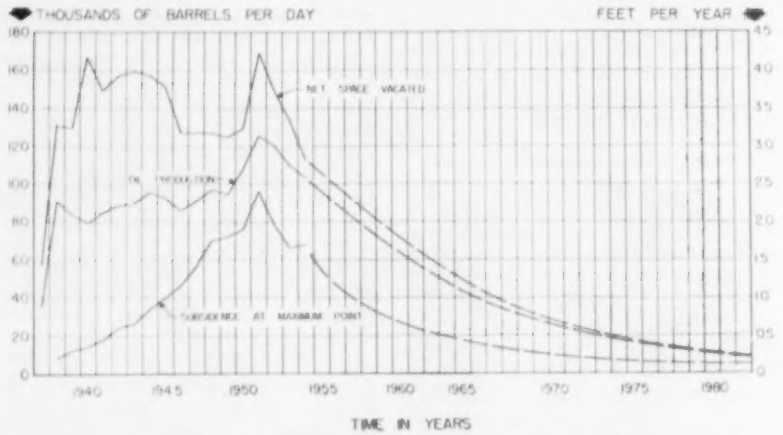
During the past 15 years this unique phenomenon has been studied by a number of scientific investigators. They agree generally that the sinking has been caused principally by oil-field operations. Opinions varied, however, regarding the magnitude of future subsidence. Based on current knowledge, past predictions have been consistently low.

Fig. 2 depicts Wilmington's daily rates of stock-tank oil production, the "net vacated space," and the annual rate of subsidence as functions of time. (Net vacated space is the pore space of the oil reservoir rock that becomes occupied by free gas as a result of the production of oil and water.) Similarity between the subsidence-rate curve and the fluid-withdrawal-rate curves is apparent if the subsidence is assumed to lag the fluid withdrawal markedly during early years of production. Concept of such a time lag has been treated by earlier investigators,[1] and is discussed herein later on.

Possible Causes of Subsidence

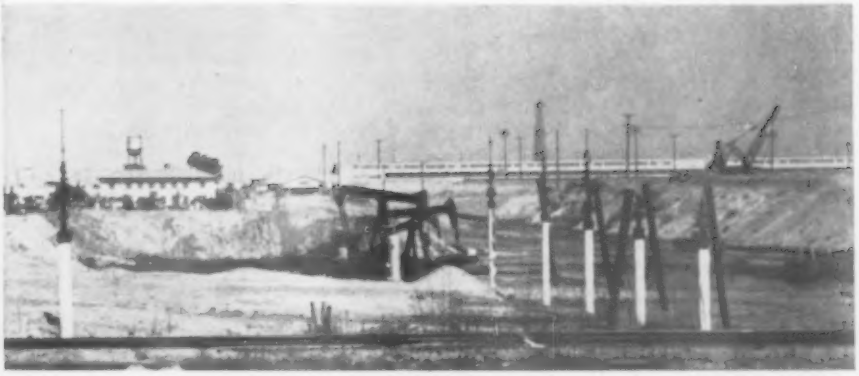
Possible causes of subsidence in the Wilmington area are: (1) tectonic movements, (2) surface loading and vibrations, (3) reactions in shallow water sands, (4) fluid withdrawal from oil reservoirs and associated strata.

Tectonic movements . . . Southern California is the center of considerable tectonic activity. Resulting earth move-



HISTORICAL RECORD and prediction of net vacated space, oil production, and rate of subsidence in Wilmington oil field; fluid-withdrawal rates pertain to the Tar, Ranger, and Terminal zones. Fig. 2.

Authors are professor of petroleum engineering at Stanford University, Stanford, and associate professor of petroleum engineering at University of California, Berkeley, respectively.



to be raised. Extensions of the oil-well casing (appearing as white vertical posts) will be underground when the land is filled in. Fig. 1.

to Halt Wilmington Sinking

to offer key to surface-subsidence problem

and W. H. Somerton

ments are to be expected. However, there is no geologic evidence which would explain localized movement to such an extreme degree as has occurred in the Wilmington oil field area.

The pattern and closure of the iso-subsidence contours precludes the possibility of localized fault movements as a significant cause. The buckling of casing and other mechanical failures of wells discount the possible importance of basal subsidence. Extensive studies of land movements in the Los Angeles Basin region lead to the conclusion that only a small part of the subsidence may be attributed to general land movements in the area.[3]

Surface loading and vibrations . . . A large part of the present land area affected by subsidence was originally marsh land which has been reclaimed by adding earth fill. The area is one of much industrial activity; this activity was markedly accentuated during World War II. Surface loading of the fill material by heavy industrial structures coupled with vibrations due to drilling rigs, pumping equipment, transportation and other heavy equipment has undoubtedly caused some local compaction.

It is well known that a much denser packing of loose sand can be achieved in the laboratory by a combination of surface loading and vibration than by surface loading only. The vibration is of particular importance in the reorientation of sand grains to more stable and more compact positions within the mass.

Compaction by this process is probably restricted to the fill material. As this material has a maximum thickness of about 25 ft., the resultant shrinkage would be small compared to the depth of the main subsidence bowl. Effects of surface loading and vibrations die out rapidly with depth. Also the underlying porous rocks, which are deposited by natural sedimentation processes, would exhibit near maximum stability with respect to mineral grain orientation.

Gilluly and Grant[3] indicate that the effects of surface loading and vibrations are small. They report very little correlation between the location of disturbances of this type and subsidence.

Reactions in shallow water sands . . . Subsidence of extensive land areas due to lowering of the water tables in fresh-water sands is becoming increasingly important in many parts of California.[6] Moreover, the sinking of Mexico City at the rate of 1 ft. per year is attributed to lowering of the water table in confined aquifers underlying the city.[1]

A most conclusive example of this phenomenon was the lowering of the land surface which resulted from dewatering of shallow sands during construction of the Navy graving dock on Terminal Island. A large quantity of water was pumped from the coarse, permeable sands, about 140 ft. thick and containing confined water. Subsidence was observed almost immediately. It reached a maximum of ½ ft. before pumping was discontinued.

As hydrostatic head was restored to the sand beds, partial recovery was observed. Recovery ranged from 15 per cent in areas of greatest subsidence to nearly 80 per cent in regions of lesser total subsidence.

Sodium-base montmorillonite may shrink in volume considerably when subjected to highly saline waters. Ocean water is known to have invaded fresh-water aquifers in the general area. Some subsidence could be attributed to the shrinkage of clay minerals associated with invaded fresh-water aquifers.

Of the causes of subsidence discussed to this point, those due to reactions in shallow water sands appear to be the most significant. Except for the Navy graving-dock dewatering operations, there have been no known exceptionally heavy withdrawals from water sands in the area. Subsidence caused by such withdrawals is probably regional in nature and the net effect in the Wilmington area specifically is probably negligible.

Fluid withdrawal from oil reservoirs . . . Bulk of the evidence pertaining to land settlement in Wilmington field indicates that subsidence is intimately associated with the withdrawal of fluids from oil-productive zones and associated strata. To June 1955, 1.08 billion barrels of reservoir fluids had been removed from the upper three productive zones.

Gross thickness of these zones (Tar, Ranger, and Terminal) totals approximately 2,000 ft. The formations involved (lower Pliocene and upper Miocene in age) are described as consisting of alternate shale, sandy shales, and loosely consolidated sand.[5] Approximately 50 per cent of the total thickness is considered oil productive. Porosity of oil-productive sands is high, ranging between 29 and 34 per cent. Average permeability is above 450 md.

Deeper zones in the field contribute

about 10 per cent of the total oil production. They are smaller in areal extent and more competent in nature. Thus they are not believed to have played a significant role in the subsidence problem.

History of the subsidence bowl and production records indicate that the center of maximum subsidence tends to remain vertically above the geometric center of fluid withdrawal in the reservoir. Center of fluid withdrawal cannot be determined accurately, but the approximate center has shifted to the southeast as production has been extended in this direction.

Point of maximum subsidence has not shifted appeciably in this direction, but the isosubsidence contours have elongated toward the southeast. Thus the center of volume of subsidence has shifted in the direction of the moving center of fluid withdrawal.

Compaction of porous rocks . . . Considerable question exists regarding the actual process of compactness resulting from fluid withdrawal. Gilluly and Grant[3] believe the compactness occurs almost entirely in the oil sands themselves. Harris and Harlow[4] contend that compactness of shales interbedded in and adjacent to the oil sands are important in causing subsidence. Laboratory compressibility tests show no consistent difference between shales and sands relative to the degree of resulting compactness. These investigators, however, have not considered capillary-pressure effects. If these effects are considered, it is possible that these two points of view may be reconciled.

Capillary equilibrium cannot be maintained unless water moves into the oil zone to replace produced oil. The rate of this water movement would be slow if the surrounding rocks were sands and shales of low permeability. Dewatering of these surrounding rocks could result in their compactness. Tension developed within the oil reservoir rock during the time lag involved in the water influx could likewise cause deformation of the oil sands.

An over-all time lag between fluid withdrawal and subsidence has been evident at Wilmington, although in a few instances individual bench marks have responded in movement with no time lag. If shale dewatering contributes to the total compactness, a time lag would be expected because of the generally low permeability of shales.

The question of the process of compactness is perhaps of more academic than practical interest. Significantly, however, the capillary concept indicates that both shale and sand compaction can be important in causing subsidence. On the average the several oil zones at Wilmington are made up of approximately 50 per cent shale.

Earlier studies . . . Previous investigators have shown that subsidence could be predicted from pressure decline and net sand thickness data if a "compression modulus" is known for the reservoir rock.[3 4] Such a modulus was determined by laboratory tests on cores from the several oil-productive zones and subsidence was calculated.

Certain difficulties centering around the validity of basic reservoir data available for these analyses are apparent. An elastic parameter must be used which is truly representative of the subsurface rocks. Scanty and highly variable laboratory test data were used for this purpose. The differential-pressure values needed for the analyses are likewise difficult to evaluate to the required degree of precision.

There is also question as to whether average static reservoir pressures should be used in the analyses rather than some average drawdown pressure which would relate subsidence to actual producing conditions. Finally, the question of thickness of the zone which is undergoing compaction as a result of pressure decline remains unanswered. Probably more than the "net sand thickness" should be considered.

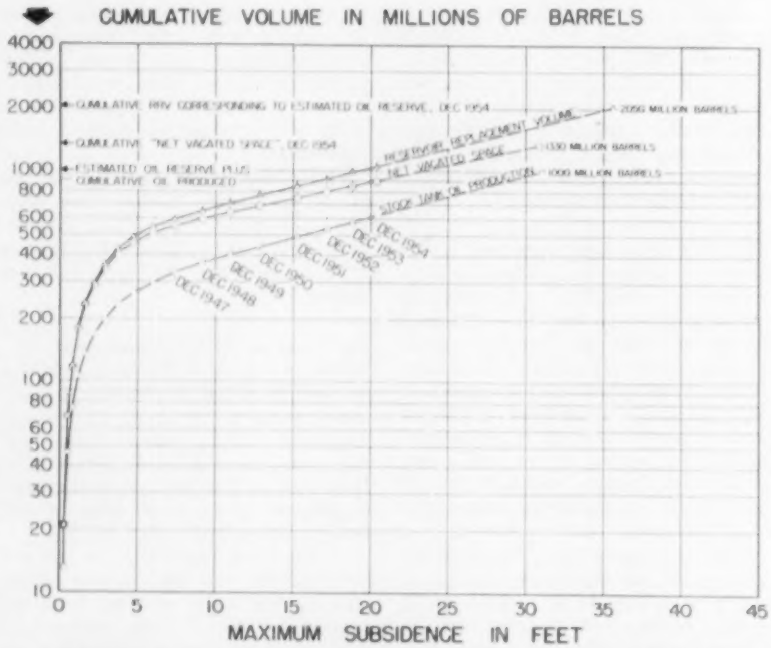
Earlier subsidence predictions which have given results later proven to be too low can be explained, at least in part, by the apparent time lag in subsidence. This was an important consideration in Harris and Harlow's[4] original prediction. Because of the brief history of reliable measured subsidence (1945-1948) their prediction likewise fell short of the presently indicated ultimate value. With later subsidence history, it is certain that earlier predictions can be greatly improved.

Present Method for Predicting Future Subsidence

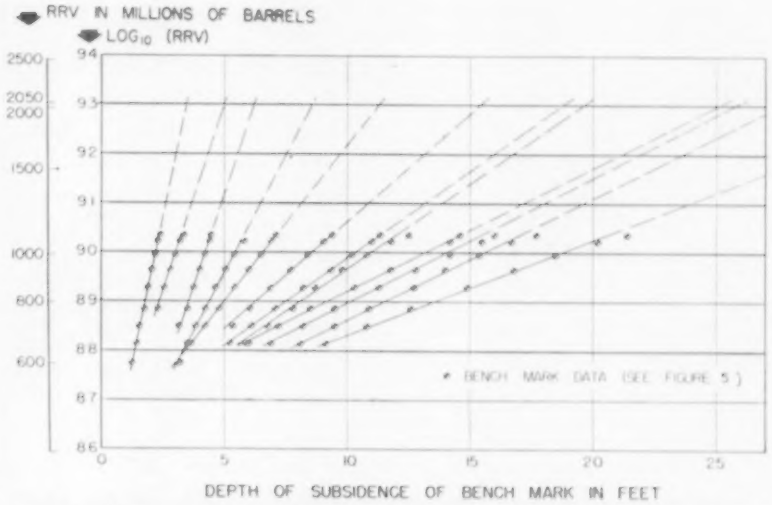
Empirical correlations . . . A smooth curve on arithmetic coordinate paper results when the measured subsidence at the epicenter of the depressed area is plotted against the corresponding cumulative withdrawal of oil, the cumulative net vacated space (NVS), and the cumulative reservoir replacement volume (RRV). (Reservoir replacement volume is defined as the net vacated space plus the reservoir volume of the water that has encroached into the rock from sources outside the oil reservoir.)

The same data on semilogarithmic coordinate paper with either cumulative oil production, cumulative NVS, or cumulative RRV on the logarithmic scale and maximum subsidence on the arithmetic scale plot as essentially straight lines for the past 9 years (Fig. 3). These correlations indicate a cause-and-effect relationship.

This finding is supported by similar results pertaining to points other than the epicenter. Of the several hundred bench marks located in the subsidence area, 32 were selected for the present



RELATIONSHIP of maximum depth of subsidence to cumulative reservoir displacement volume, net vacated space, and stock-tank oil production. Fluid-withdrawal rates pertain to Tar, Ranger, and Terminal zones. Fig. 3.



RELATIONSHIP of depth of subsidence of various bench marks with cumulative reservoir replacement volume; distribution of these bench marks are shown on Fig. 5. Fig. 4.

study. The selected bench marks are distributed fairly evenly throughout the bowl. Thus changes in their elevation with time should disclose a relation between subsidence and areal location. Moreover, each of them has been located for several years without damage or extraneous disturbance so that sufficient subsidence information is available for analysis.

Fig. 4 depicts on semilogarithmic coordinate paper the functional relationships of cumulative RRV and depth of subsidence for 12 of the 32 bench marks. A reasonable straight line for each of these, as well as the other 20 bench marks, was obtained.

The simplicity of the correlations obtained provoke two important queries: (1) Accuracy of the bench-mark elevations and the calculated volumes of fluid, and (2) validity of the results developed through extrapolation of the straight lines.

The city engineer of Long Beach determines quarterly the elevation of several hundred bench marks in Wilmington field and its vicinity. These elevations are all relative to a tide gage designated "Tidal 8" at berth 60, Municipal Pier No. 1, Los Angeles Harbor, several miles away.

Geologists and geodetic surveyors recognize that the Southern California coast as a whole is gradually moving downward. The region involved in this movement includes both the Tidal 8 location and the Wilmington - Long Beach Harbor areas. Accordingly, the regional movement probably affects Tidal 8 and the bench marks in the oil field similarly. Moreover, Tidal 8 is too far from the oil field to be affected by local distrubances. Therefore, the difference in elevation between Tidal 8 and any bench mark in the oil field should reflect only the local subsidence in the vicinity of the field.

The Harbor Department of the city of Long Beach prepares subsidence contour maps annually (Fig. 5). They portray the geometry of the subsidence bowl in the field and over a period of years indicate the changes in the geomery of the bowl. The accuracy of these contour maps is not questioned in light of the method used in determining changes in the elevations of the bench marks.

Material-balance principles disclose that NVS for a period of 1 year is given by the equation:

$$NVS = N(B'-B'') + n''B'' - n'B' - (W_e''-W_e') + (W_p''-W_p')$$

where

N = volume of stock-tank oil in place initially

B' = single-phase formation-volume factor for reservoir oil at beginning of year

B'' = single-phase formation-volume factor for reservoir oil at end of year

n' = volume of stock-tank oil produced from time of discovery of field to beginning of year

n'' = volume of stock-tank oil produced from time of discovery of field to end of year

W_e' = volume of water influx into oil reservoir from time of discovery of field to beginning of year

W_e'' = volume of water influx into oil reservoir from time of discovery of field to end of year

W_p' = volume of water produced from field from time of discovery of field to beginning of year

W_p'' = volume of water produced from field from time of discovery of field to end of year

The cumulative net vacated space (NVS) was obtained by adding the annual NVS's determined with the equation.

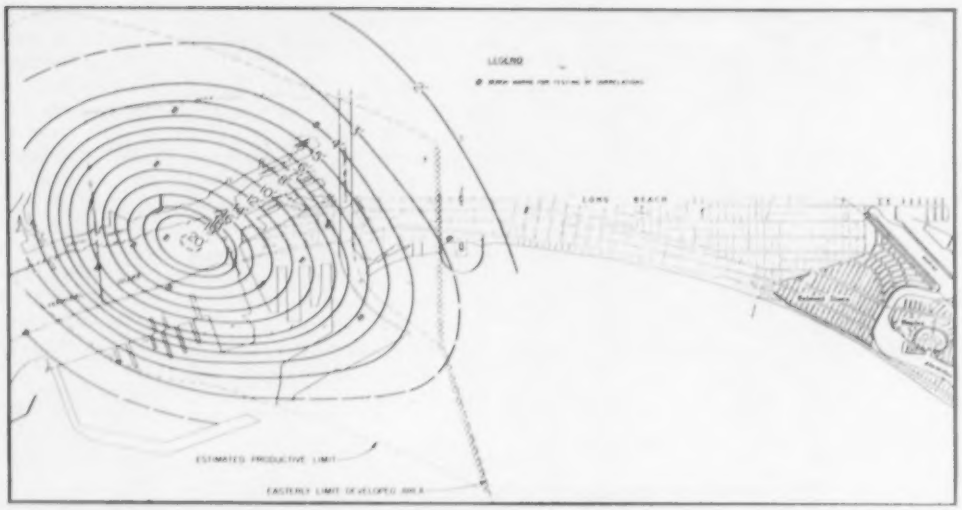
The last parenthetical quantities in the equation for NVS vanish if the annual rate of water influx is assumed equal to the annual rate of water production. This assumption was made to determine the cumulative values of NVS used in plotting Figs. 2 and 3. If the term in the equation symbolizing the annual rate of water influx is transposed, the left side of the equation becomes equal to NVS + $(W_e''-W_e')$ or RRV. This transposition was made to determine the cumulative values of RRV plotted in Figs. 3 and 4.

In developing this material-balance equation the conventional assumptions of negligible solubility of free gas in the reservoir water and negligible expansibility of the reservoir water were made. In conformance with previous studies[5] of the field, the pore volume was assumed to be occupied by no free gas initially. The pore volume of the oil reservoir was assumed to remain constant; the resultant error, if any, in calculated values of cumulative NVS and cumulative RRV probably does not exceed 6 per cent.

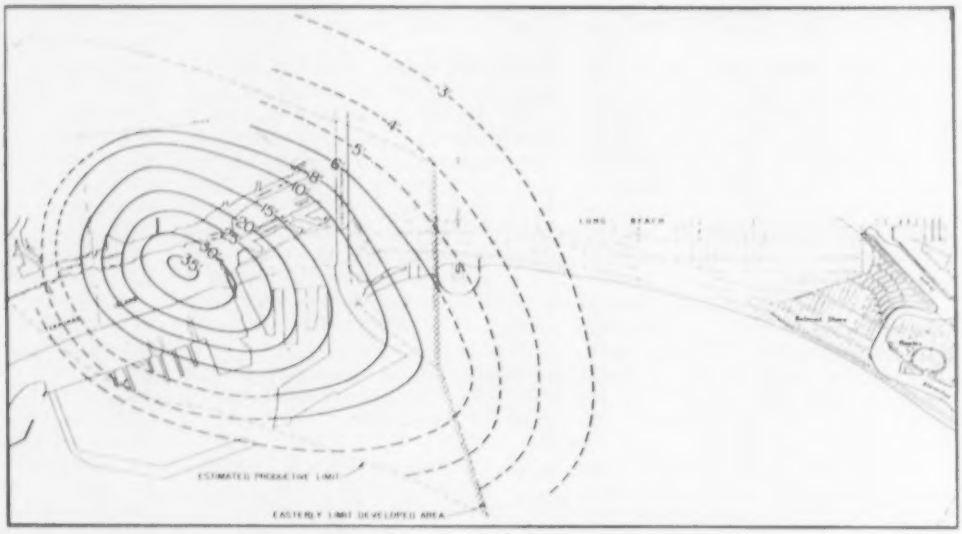
The terms of the equation denoting produced volumes of stock-tank oil undoubtedly represent the most accurate data collected. The term representing stock-tank oil in place initially, is doubtful. It is the same for all sets of calculations, however, so that the results obtained with the correlations of cumulative NVS and cumulative RRV with depth of subsidence are unaffected.

The numerical value of the stock-

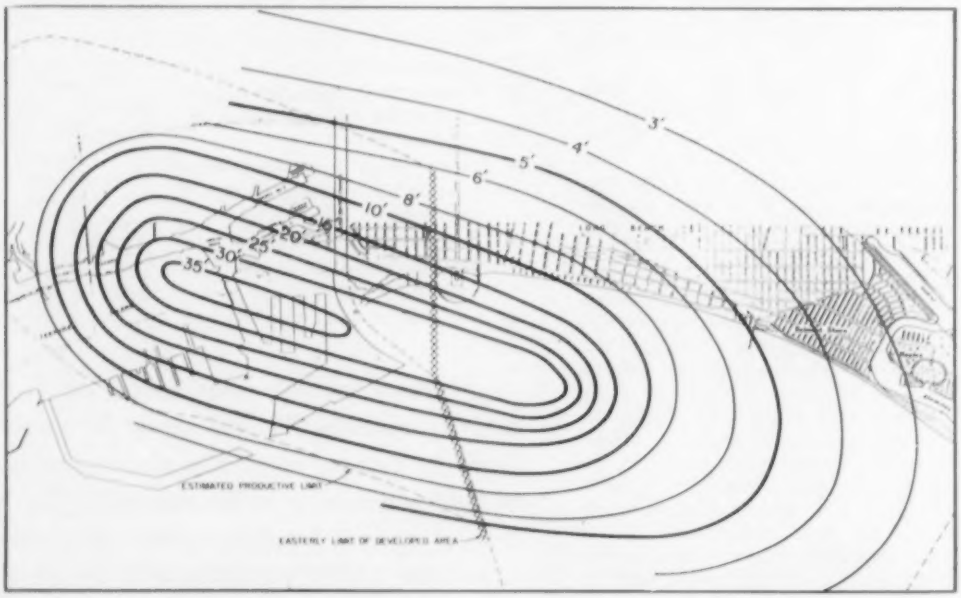
"History of the subsidence bowl and production records indicate that the center of maximum subsidence tends to remain vertically above the geometric center of fluid withdrawal in the reservoir. Center of fluid withdrawal cannot be determined accurately, but the approximate center has shifted to the southeast . . ."



SUBSIDENCE contours in Wilmington oil field as of August 1, 1954. (Long Beach Harbor Department). Fig. 5.



SUBSIDENCE contours showing size and shape of ultimate subsidence bowl, predicted on basis of all further oil production from presently developed area of field. Fig. 6.



SUBSIDENCE contours showing size and shape of ultimate subsidence bowl, predicted on basis of future oil production from the presently developed southeastern area of the field. Fig. 7.

"A decline in reservoir fluid pressure has been established as a cause of increasing intergranular stress in the reservoir rock and of the resultant deformation of the rock. Reductions in average pressures in the reservoir . . . are reflected in the net fluid withdrawals from the reservoir rock."

tank oil in place initially was determined by dividing the sum of the cumulative oil production and estimated oil reserves by an oil-recovery factor.

The single-phase formation-volume factors in the equation were developed by plotting these factors for each of the Tar, Ranger, and Terminal zones as functions of pressure, and then averaging the results. This was done by weighting the zonal factors at various pressures in accordance with the contribution of the zone to the total oil production of all three zones. Although the results of this procedure are numerically inexact they are consistent and therefore appropriate for their purpose. The annual rates of water production of the zones were computed from data reported by the California Conservation Committee.[2]

A decline in reservoir fluid pressure has been established as a cause of increasing intergranular stress in the reservoir rock and of the resultant deformation of the rock. Reductions in average pressures in the reservoir are virtually impossible to determine with a satisfactory degree of accuracy, but they are reflected in net fluid withdrawals from the reservoir rock. Rates of fluid withdrawal (gas, oil, and water) can be determined with considerable accuracy. Thus, the correlations in this report are related to declines in reservoir pressures.

As subsidence is attributed to pressure reduction, these correlations have a sound scientific basis. The specific functional relationships shown in Figs. 3 and 4 undoubtedly depend on the physical properties and behavior of the underlying masses of rocks and fluids. Prediction of these specific relationships would be impossible on the basis of theoretical considerations alone.

Application of Correlations to Prediction of Subsidence

The correlations of subsidence and fluid withdrawal (Figs. 3 and 4) were utilized in predicting the ultimate subsidence contours shown in Figs. 6 and 7. The straight-line relationships of logarithm of cumulative RRV and subsidence were extrapolated to the estimated ultimate RRV of 2.05 billion barrels and the corresponding ultimate depth of subsidence read from the chart in each instance.

This estimated ultimate RRV of 2.05 billion barrels is based upon an assumed oil-recovery factor of 21 per cent, a total of 1.0 billion barrels for the cumulative oil production plus oil reserve (as of January 1, 1954), upon estimated future water-production rates, and upon measured single-phase formation-volume factors.

These data were organized for substitution in the foregoing material-balance equation. The volume of stock-tank oil in place initially was determined by dividing 1.0 billion by 0.21. Interestingly enough, the estimated subsidence of 35 ft. is changed by less than 1 ft. when the oil-recovery factor is changed from 21 to either 15 or 25 per cent.

The water-production data were plotted in the form of water-oil ratios for the three zones involved and extrapolated to a cumulative stock-tank oil production of 1.0 billion barrels. The single-phase formation-volume factors were determined by the method described previously.

The predicted ultimate subsidence data pertaining to the epicenter as well as to 32 other bench marks in the present subsidence area were plotted on the base map. Smooth contour lines were constructed through the resultant points to develop the size and shape of the predicted ultimate subsidence bowl. Contour lines outside the control area—beyond the areal limit of the bench marks used in the analysis—are shown as broken lines. They were located by using the present measured bowl as a guide to the shape of the future bowl.

Prediction of the size and shape of the ultimate subsidence bowl which would result if the undeveloped southeastern part of the oil field were drilled and produced by the methods of operation of the presently developed area, is more difficult. If the volume of the economically recoverable oil in the undeveloped area is assumed to equal half that of the presently developed area under conditions of current production practice, an ultimate RRV of 1.0 billion barrels would be expected for the undeveloped portion.

If the subsurface fluids are in pressure connection throughout the reservoir rock the argument might be presented that this 1.0 billion barrels should be added to the ultimate RRV of 2.05 billion barrels for the presently developed area to obtain a new ultimate subsidence of about 43 ft. An argument of equal logic, however, is that the southern part of the field is substantially removed from the present center of subsidence; that settling in the southeastern portion would be caused almost entirely, therefore, by the withdrawal of fluids from wells in that area. If this were true, a separate bowl of subsidence would form in the presently undeveloped area.

Most probably the withdrawal of fluids from wells bottomed in the strata underlying either one of the areas would cause subsidence in both, to the extent that the two subsidence bowls overlap. The subsidence contours of Fig. 7 are based on this line of reasoning, hence, the depth of the bowl does not exceed 35 ft.

The ultimate subsidence bowls of Figs. 6 and 7 could also have been predicted from correlations of depth of subsidence and either cumulative NVS or cumulative stock-tank oil production, as well as by cumulative RRV. In none of the three cases, however, has the effect of time lag been specifically considered. As a result of time lag, subsidence can be expected to continue after the production of fluids from the field is discontinued. Quantitative evaluation of the magnitude of this additional subsidence has not been possible. Therefore an ultimate subsidence of 35 ft. at the epicenter is considered conservative.

The effect of time lag can be interpreted at least qualitatively from Fig. 3. If, for example, the straight-line segment of the cumulative RRV curve is extrapolated to the volume axis, and intercept representing about 430 million barrels is determined. Thus even though the curve indicates that subsidence is caused by increases in cumulative RRV, a large initial RRV is necessary before any appreciable subsidence is manifest. If this is indicative of a time lag, subsidence may be expected to continue after fluid withdrawal has ceased.

The time effects associated with the compression of unconsolidated sand in the laboratory support the concept of a time lag in Wilmington surface subsidence. Terzaghi and Peck[8] define the void ratio of a sand as the ratio of the volume of the voids to the volume of the solid substance. They show that if the process of applying an increasing compressive force on the sand is interrupted the void ratio will decrease at constant load. They attribute this decrease to a lag in the adjustment of the positions of the gains.

On this basis, if increasing cumulative RRV in Fig. 3 is interpreted to represent increasing "load," the possibility of further subsidence following

the cessation of the oil-field operations is not precluded.

Arresting or Minimizing Subsidence

Three methods could be applied to check sinking of the land surface in the vicinity of the field. If gas, oil and water production are accepted as the basic cause of the movement of the surface, then discontinuance of production of these fluids should stop the sinking eventually. Such a method would represent only a last-resort measure. It would cause a vast quantity of economically recoverable oil to become unavailable.

Gas could be used to replace the reservoir oil and water withdrawn from the oil reservoir rocks and to maintain and control the reservoir pressure. In this manner gas injection would be beneficial in arresting or minimizing subsidence. However, the local supply of gas in the vicinity of the oil field probably is inadequate.

In contrast, water is plentiful and the feasibility of water injection is being tested by pilot injection projects in the field. Pressure maintenance and control by water injection appears therefore to be the most practical method.

The natural oil-recovery mechanism in the reservoirs of the field is predominately of the solution-gas-drive or depletion type, based on rates of decline of reservoir fluid pressures. It is recognized generally that under similar rock and fluid conditions, water drives result in higher oil-recovery efficiencies than depletion drives. A full-scale coordinated water-injection program should result in a substantial increase in the ultimate recovery of oil in addition to retarding and eventually stopping subsidence.

Encroachment of natural edge water probably will increase oil recovery in some parts of the field even if a program of water injection is not undertaken. The natural flood would advance, however, under conditions of low pressure. In a water-injection program the pressures would be maintained at a considerably higher level.

Maintenance of reservoir pressure or restoration of reservoir pressure to a high level causes the reservoir oil to retain desirable characteristics. For example, the absolute viscosity of a Ranger Zone crude will increase about threefold if the pressure declines from 1,600 to 200 psia.

Action taken in the past to cope with the subsidence problem has been to remedy the effects rather than eliminate the cause. No major action of the magnitude necessary has been taken to prevent the subsidence directly. These facts and impracticability of abandoning the field or of injecting large volumes of gas, plus the cause-and-effect implication of the foregoing fluid withdrawal-subsidence correlations lead to water flooding as the apparent solution of the problem.

"Action taken in the past to cope with the subsidence problem has been to remedy the effects rather than eliminate the cause. No major action of the magnitude necessary has been taken to prevent the subsidence directly . . . water flooding is the apparent solution to the problem."

Since the process of compaction resulting from reservoir pressure decline is essentially irreversible, restoration of pressure in depressured portions of the field would not raise the land surface any significant degree. Restoration of pressure, however, would cause the oil to have characteristics that are more desirable and would arrest further settlement of the land. Thus, the problem involves an important element of timeliness.

The southeast part of the oil field is undeveloped so that estimates of the oil reserves of this area are uncertain. The northwest-southeast trend of the major axis of the large relatively flat lying anticlinal structure comprising the oil reservoir indicates that a sizable proportion of the field is in the undeveloped area. Failure to develop this area would be seriously wasteful of the natural resources of petroleum in California.

The land would continue to subside at a significant rate even if the southeast portion of the field remains undeveloped. On the other hand, proper development of this southeasterly part of the field with pressure maintenance by water injection would tend to arrest elongation of the subsidence bowl to the southeast. Consequently, development of this area should be considered in a large-scale water-flooding program or in any other program that might be devised to solve the subsidence problem.

"Oh, our firm still has the know-how, but since the change in administrations we haven't the know-who."

Acknowledgments

The study discussed in this report was made at the invitation of Richfield Oil Corp., Los Angeles. Assistance of the staff of the production department of this company is gratefully acknowledged. Special thanks in this respect are due Clyde Perry, W. S. Payne, Jr., E. M. Benson, Jr., and R. W. Clark, Jr.

C. M. Beeson, University of Southern California, and S. T. Yuster, University of California, Los Angeles, are gratefully acknowledged for their help in initial planning phases of the project. Sincere appreciation is offered to R. C. Earlougher, Earlougher Engineering; R. R. Shoemaker, Long Beach Harbor Department; Frank J. Hardesty, Long Beach Harbor Department; and Lee S. Osborne, Union Pacific Railroad Co., for their work in reviewing manuscript copies of this report.

References

1. Carillo, Nabor: "Measurement of Settlements and Comparison with Theory Discussion." Second International Conference on Soil Mechanics and Foundation Engineering, Proceedings v. VI, June 21-30, 1948.

2. Conservation Committee of California Oil Producers: Annual Review of California Crude Oil Production, distributed annually to California Oil Producers from the committee's main office, Los Angeles, Calif.

3. Gilluly, J., and Grant, U. S.: "Subsidence in the Long Beach Harbor Area, California," Bull. Geol. Soc. Am., v. 60, March 1949, pp. 461-529.

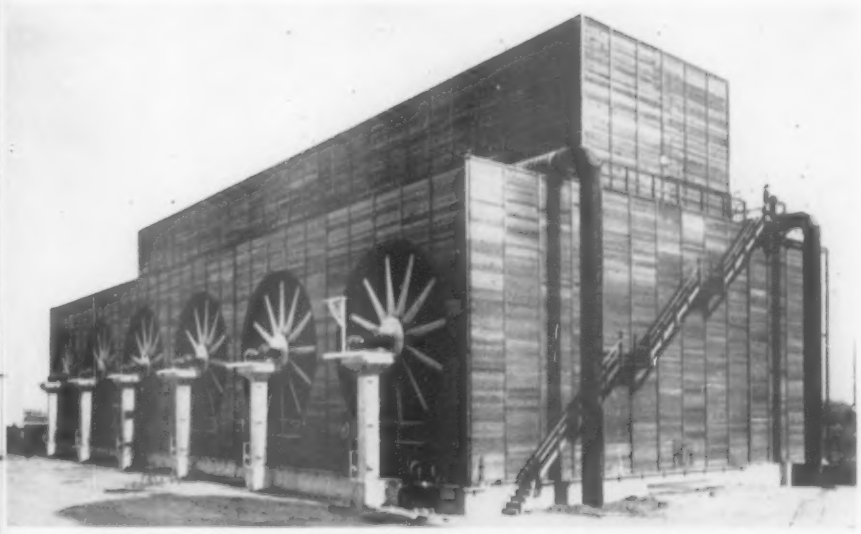
4. Harris, F. R., and Harlow, E. H.: "Subsidence of the Terminal Island-Long Beach Area, California." Proc., Am. Soc. Civ. Eng., v. 73, No. 8, Oct. 1947, pp. 1,197-1,218.

5. Railroad Commission of the State of California and Department of Natural Resources, Division of Oil and Gas: Estimate of the Natural Gas Reserves of the State of California as of January 1, 1946, Case No. 4591, Special Study S-525, San Francisco, Calif.

6. State of California, Division of Mines: "Land Subsidence in California," Mineral Information Service, v. 8, No. 7, July 1, 1955, pp. 1-6.

7. Stockman, L. P.: "California Liquid Hydrocarbon Production, Reserves" (Tables): Petroleum World v. 51, No. 42, October 21, 1954, pp. 42-47.

8. Terzaghi, K., and Peck, R. B.: Soil Mechanics in Engineering Practice, John Wiley & Sons, New York, 1948, 566 pp.



THE NEW LOOK in forced-draft cooling tower design incorporates features for better distribution of air: crossflow principle, greater drift-eliminator area, greater discharge velocity.

Forced-Draft Cooling Tower Stages a Comeback

. . . but it has a new look

by Art Smith

AFTER being in eclipse for 15 years, a highly modernized version of the forced-draft design in water-cooling towers is making its appearance on the industrial scene.

In refineries and power-generating stations in widely separated locations, large-capacity forced-draft towers that retain little more than basic principles of the original design have been installed in the past 2 years and more are on contract.

Perhaps the greatest influence in this renaissance of the forced-draft tower was the attitude of Pure Oil Co.

Constant observation and detailed records kept by that company's engineers pointed to tower maintenance as an area of definite improvement. Analysis indicated that repairs of fans and drives were a major item of maintenance expense. Not only corrosion or failure of fan blades, but also harmonics due to fans resulted in serious vibration causing loosening and breakage of bolting and misalignment of drives.

Both flume and spray-nozzle hot-water distribution systems were another center of constant irritation. Before cleaning could be scheduled, there was always a period of impaired cooling efficiency.

Demand New Tower Design

With this thought in mind, the Pure Oil Smiths Bluff, Tex., refinery, presented the problem to cooling-tower manufacturers to design a tower meeting the following conditions:

1. To cool 36,570 g.p.m. from 120° F. to 90° F. at 82° F. wet bulb which will give high over-all efficiency of cooling.

2. Power requirements to be at a minimum for driving fans and lifting hot water.

3. Water distribution to be arranged to preclude difficulties with plugged nozzles or flumes, and to permit easy access to the distribution system for inspection and economical and rapid cleaning.

4. Fans and drives shall be arranged with stable foundations to prevent vibration to the tower with resultant loosening or breakage of fastenings. Furthermore, materials of construction shall be suitable for resisting corrosion in the Texas Gulf Coast area.

5. Refinements shall be embodied to permit machinery inspection and lubrication thereof without shutting down fans and without hazards to personnel.

Producers of the design that was ultimately accepted had previously built many forced-draft towers and selected that type as the one which met most of the requirements. The outstanding advantage, mechanical reliability, was accepted as a fact; primary attention was devoted to the known limitations —unequal air distribution and recirculation of discharge vapor with resultant affect on cooling ability.

Emphasis on Performance Changes

In the original forced draft types, incomplete distribution of air was a deterent to good cooling performance. Air was forced into a completely filled area through which it flowed in a sharp curve to the open top discharge area. The upper area nearest the fan and the lower area farthest from the fan were thus rendered ineffectual.

This fault was eliminated by adopting the cross-flow principle (horizontal air flow through the entire cooling area). In the new design the filling was arranged to provide a generous plenum chamber between the fan and the filling. Together with greatly increased drift-eliminator area, this step equalized pressure throughout the filling with a consequent increase in effective cooling ability with minimum draft loss.

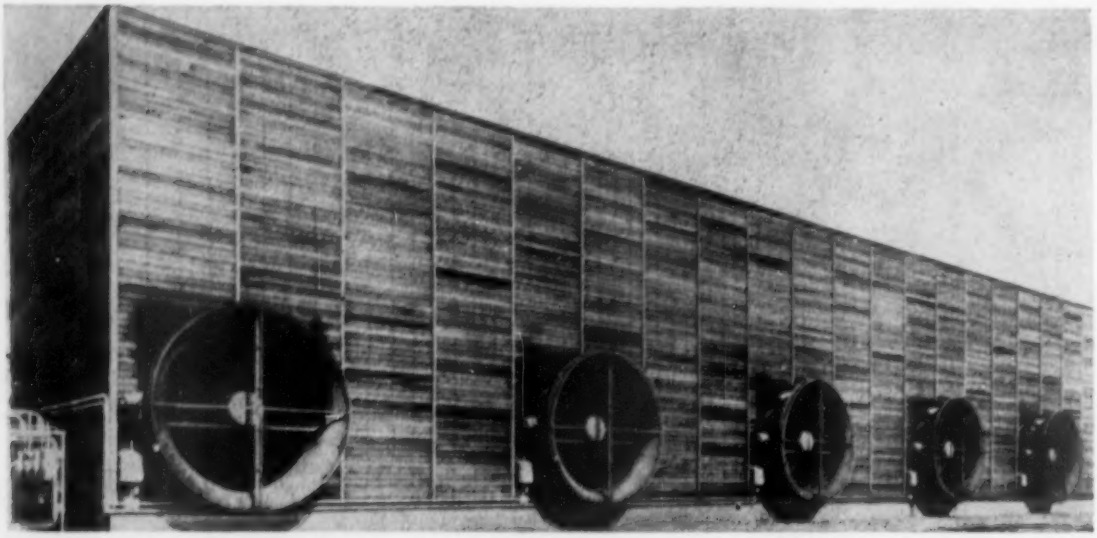
Another important change affecting performance was provision for greater discharge velocity. With warm, moist air being discharged at low height at a velocity of approximately 300 ft. per minute, recirculation and ground fogging presented serious performance problems with older designs.

In the new tower a discharge area was added to the cooling area and a stack placed above it. The stack area, one-half that of the cooling area, discharges air high above ground level at 900 ft. per minute velocity. The former problem of recirculation of discharge vapors was thus eliminated in the new design.

Equal distribution of water and elimination of much of the time and expense of maintaining the water distribution system was attained by using an open hot water distribution basin above the cooling chamber.

Mechanical Equipment

The basic mechanical principles of former forced draft designs have a long established record of success. Many of these towers in service 20 or more years are operating today with very little maintenance of equipment. Fans, power transmission units, and motors are mounted on rigid foundations entirely separate from the tower itself.



FIRST TOWER OF NEW DESIGN was installed at Pure Oil's Smiths Bluff, Tex., refinery. Actually the Pure tower is an eight-fan-cell structure, arranged four cells back-to-back. Other towers are in St. Louis and Chicago area refineries.

Mounted in this manner, the mechanical elements are not subject to vibration that is unavoidable in other types of towers. Being located away from the humid air stream, the equipment is not affected by corrosion or contamination of transmission lubricants.

Structural and power transmission elements were redesigned to accommodate greater load and higher horsepower. The 12-ft. fan that once was maximum for towers of this type has been superseded by a 22-ft. multiblade model with power supplied by a 75-hp. motor. A heavy-duty reduction-gear unit is coupled directly to the motor so no drive shaft is necessary.

A reinforced-concrete column topped by a platform supports the fan and drive equipment. A steel ladder and handrail make inspection safe and simple.

Completed project . . . The Pure Oil tower is an 8-fan-cell, crossflow tower. It is arranged with four cells back to back, utilizing a single cold-water basin and a common discharge stack. The over-all size is 84 ft. wide by 120 ft. long. Each cell is 42 ft. from fan to division wall and 30 ft. in width.

Open hot-water-distribution basins consisting of a wood deck containing 750 ceramic nozzles in each cell division are 38 ft. above the cold-water basin.

Between the fill area and the longitudinal partition are the eliminators that remove entrained moisture from the air and direct the air stream upward through the discharge stack at the center of the tower that rises 24 ft. above the hot water basin.

Operation and maintenance . . . In operation, this tower has fulfilled expectations. It has been operating for almost 2 years and has presented no service problems of any kind. The operators have adopted a maintenance schedule that requires an absolute minimum of time.

Hot-water distribution over the tower is observed at regular intervals daily. Since this requires only sufficient time for the operator to go up the stairway to the hot water basin elevation and walk the length of the tower, it is no arduous task. At a glance, he checks the water level and flow in each cell. If necessary, the flow is balanced by adjustment of the discharge valves which are immediately at hand.

Motors and gear drives are checked at specified periods. This inspection and necessary lubrication are accomplished without shutting down fans.

Performance and test . . . When the cat cracker and cooling tower were shut down for the normal turnaround, the tower was given a very thorough inspection. This revealed that of the 6,000 nozzles that discharge hot water to the cooling chamber, only 12 were plugged. The accumulation of foreign matter on the hot-water basin floor amounted to a mere film. Careful water treatment maintained at this plant, of course, contributes to this very desirable condition. At this inspection period, the fill was clean and in excellent shape.

Six months after the tower was placed in operation, exhaustive acceptance tests were run and the tower was found to be performing up to specification in every respect.

Only during low-temperature periods when fan operation was reduced to half speed was there any tendency toward recirculation. This was slight and, of course, at these periods was not detrimental.

Another tower of the same type will soon be added to the equipment of the Smiths Bluff refinery.

Future of Forced Draft

At other locations more forced draft towers have been installed and others are in process of construction. A duplicate of the Smiths Bluff tower is furnishing condensing water for a new generating station in Arizona.

At a St. Louis refinery, a counterflow forced-draft model is in operation. On opposite sides of a main thoroughfare near Chicago, two forced-draft towers are being erected in refineries. Both will have discharge stacks rising 120 ft. above ground level to overcome fogging in this congested area.

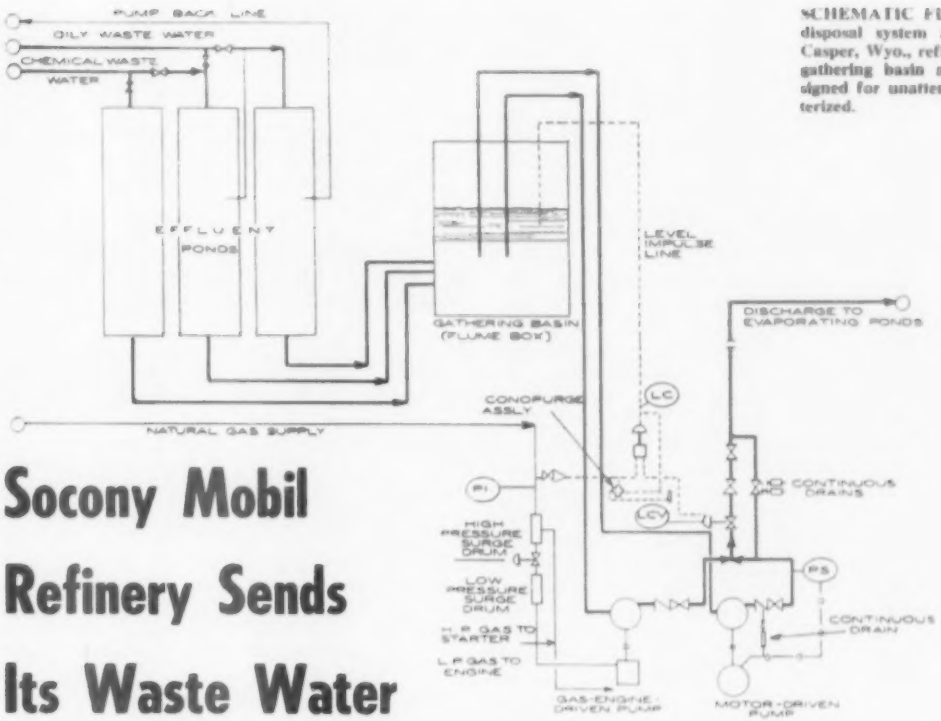
At current prices these new towers are not adaptable to quick amortization projects, but results indicate that they are self-liquidating investments in permanent power and process installations.

Acknowledgment

Acknowledgment is made to C. E. Tarte, utilities engineer of Pure Oil Co., Smiths Bluff refinery, for technical assistance in preparing this article.

THE AUTHOR

Art Smith, public relations manager of Marley Co., has had wide industrial experience. This includes the graphic arts, air transport, and other industrial fields as well as water cooling.



SCHEMATIC FLOW DIAGRAM for waste-disposal system at Socony Mobil Oil Co.'s Casper, Wyo., refinery. Automatic controls on gathering basin and pump assembly are designed for unattended operation, and are winterized.

Socony Mobil Refinery Sends Its Waste Water To This Evaporation Pond

by Gerald L. Farrar
Engineering Editor

SOCONY MOBIL OIL CO.'S Casper, Wyo., refinery is solving its industrial waste-disposal problem by using a new evaporation pond. All of the waste water from the refinery runs into this pond after treatment in the plant.

The oily waste water passes through an A.P.I. oil-water separator and an effluent basin before entering the evaporating-pond feed system. The chemical-waste streams are combined and passed through an effluent basin before entering the evaporating-pond system.

A 6-in. line carries the waste water from the plant across the North Platte River into the disposal area.

Waste-water study . . . In 1950 the Wyoming State Board of Health started a study of stream pollution to determine what controls should be set up. Socony decided to use an evaporative pond for disposal of refinery waste water at the Casper refinery after a study of all known alternative methods had been made.

The first step in selecting the disposal site was a study of United States Government topographic maps. Basins were tentatively picked and finally selected by close personal survey. The company then bought several hundred acres surrounding the basins, to make doubly sure that the foul water would be completely contained within company-owned land.

The basins were formed by wind erosion, and there is no natural drainage from them into other areas.

Waste disposal system . . . The chemical waste water in the refinery comes from the treating plant, the water treater, and the boiler blowdown. Caustic and copper chloride solutions are used in the treating plant for treating light oil. These three streams are brought together in a 10-in. main and flow directly to the chemical effluent pool.

Here the suspended solids are allowed to settle out and the clarified liquid is decanted into a gathering basin (see Fig. 1).

All oil sewers from the crude unit, T.C.C. unit, and gas plant feed into a 15-in. main. The combined stream passes through an oil-water separator. The water stream from the separator passes into the oil-effluent pond where the oil is continuously skimmed off.

Recovered oil from the effluent pond

is joined with the recovered oil from the separators and passed to an agitator to break the oil-water emulsion. The oil is then sent back to processing and ends up as feed to the cat cracking unit.

Oily water from the effluent pond passes into the same gathering basin fed by the chemical waste water.

As shown in Fig. 1, there are three effluent ponds. Two are in use at all times while the third is used as a standby.

Gathering Basin System

Waste water is pumped from the gathering basin into the 6-in. discharge line leading to the evaporating pond. The basin and pumps are in a remote area of the refinery, and the system has been completely instrumented for automatic operation. Suction lines lead from the basin to the discharge pumps.

A gas-engine-driven pump is set up for continuous operation. A motor-driven pump is used as standby and is set to come on when the pressure in the pump discharge line drops below a certain point. The rate of pump discharge is controlled by a throttling valve which is positioned by level control in the gathering basin.

The instrumentation system is winterized to prevent freezing up and inoperability during Wyoming's hard winters. The liquid-level measuring element provides a good example. High-pressure gas is fed into a line which extends below the surface of the liquid in the gathering basin. As liquid level builds up, back pressure on the Conopurge assembly builds up and the controller opens the valve in the pump effluent line. Reverse action is obtained when the liquid level falls.

Drains . . . Continuous drains are provided for various points in the system where freezing might occur. As shown in Fig. 1, drains are located at the valve in the bypass around the effluent pressure-control valve and at the check valve on the effluent on the motor-driven pump.

The 6-in. discharge line leaves the refinery, passes under the North Platte River and up over a hill to the disposal area some 8,000 ft. from the gathering basin. The line extends 2 ft. below the river bed during the crossing.

The volume of the stream going to the evaporating pond is about 150 to 250 g.p.m. The pond area was selected based on this figure and on a 48-in. per year evaporation rate in Wyoming, with a healthy safety factor incorporated.

Processing Scheme

Socony's Casper refinery runs about 7,500 bbl. per day of crude. Approximately half of this is sour stock supplied from Big Horn basin fields, such as Socony Mobil field at Manderson, Wyo. This is the 25° 2 per-cent-sulfur "Y" Line crude. The rest of the crude is sweet Cole Creek and Taylor Sussex stocks.

Plant processing facilities consist of a combination atmospheric and vacuum crude unit, a T.C.C. unit, a catalytic polymerization unit, and a straightrun asphalt unit.

Capacity of the crude unit is approximately 8,900 bbl. per stream day. Straightrun and vacuum gas oils are combined as feed to the catalytic cracking unit. Bottoms from the vacuum distillation column are sent to the asphalt plant.

The T.C.C. unit has a capacity of 7,550 bbl. per day of gas-oil feed. Some 500 bbl. per day of cat. poly gasoline can be produced, and capacity of the asphalt plant is about 1,100 bbl. per stream day.

Gulf Oil Completes Port Arthur Testing Laboratory

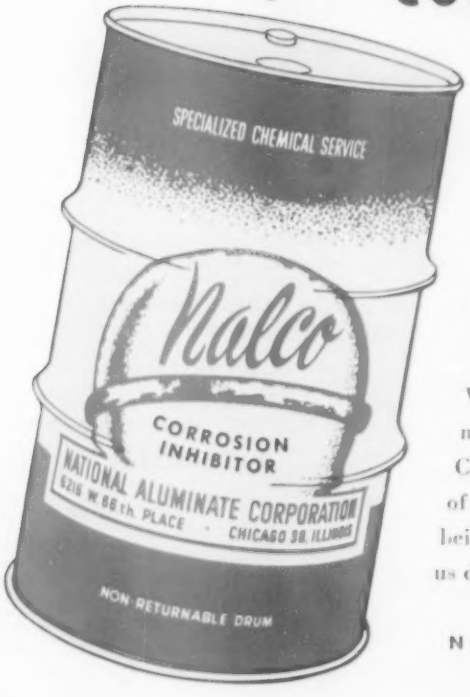
TECHNICIANS at Gulf Oil Corp.'s Port Arthur, Tex., refinery have moved into this new testing laboratory. The recently completed building replaces an older laboratory and has made it possible to combine paraffin and catalyst testing sections which formerly were housed in three other laboratories within the refinery. The front of the L-shaped building is 162 ft. long and two stories high. Behind it is a one-story wind 192 ft. long which houses the testing areas. The interior view shows part of the 75,000 product samples stored in the lab's retaining section. The automatic lift machine, which hoists samples to the storage shelves, is believed to be the only one of its kind used in the oil industry. More than 1,000 samples are delivered to the laboratory daily. They are subjected to one or more common tests requiring only a few minutes or to a complex series of tests requiring up to 4 days.

Nalco

DOWNHOLE TREATMENTS CAN STOP THIS

Pulling tubing for replacement and repairs due to corrosion damage can be stopped with Nalco Downhole Treatments.

BY *Effective* CORROSION CONTROL

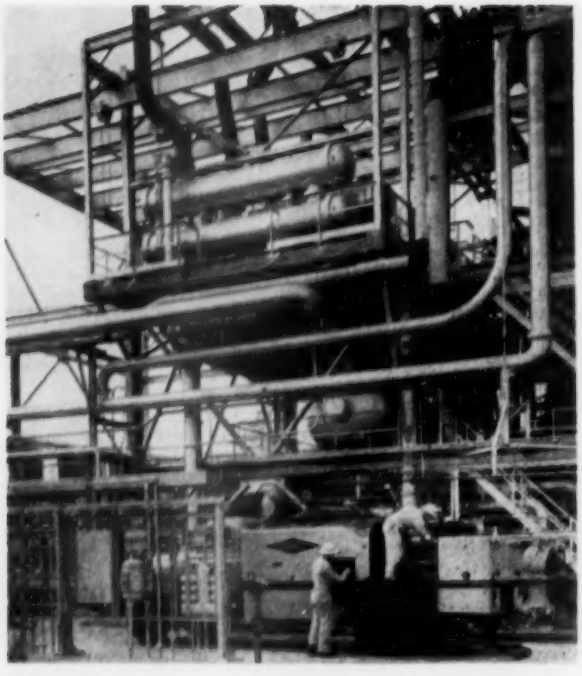


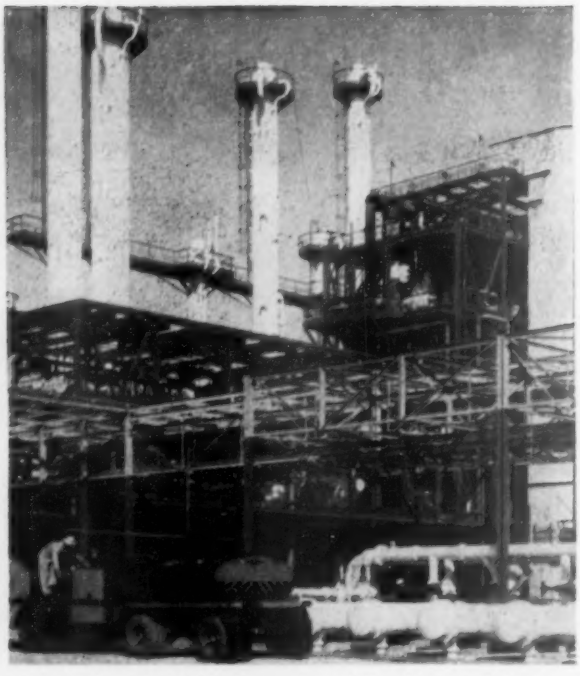
Once Nalco Downhole Treatments get to work in your producing wells, you will see a big, satisfying chunk cut out of maintenance costs created by downhole corrosion damage. Initial dosages (of either the stick or liquid type) put a tough microscopic film on all metal surfaces in contact with gas and fluid ... literally seal them off from corrosive action. Small subsequent dosages keep the film intact; substantially prolong equipment life.

We can show you plenty of case histories on plummeting maintenance costs with Nalco Corrosion Control ... Or better, *prove* Nalco effectiveness in some of your troublesome wells — even if they are already being treated. Call your Nalco Representative, or contact us direct for prompt action.

NATIONAL ALUMINATE CORPORATION
6242 West 66th Place • Chicago 38, Illinois
In Canada: Alchem Limited, Burlington, Ontario

Nalco®
PRODUCTS • **Serving the Petroleum Industry through Practical Applied Science**





CURRENT PRACTICES in chemical cleaning were summarized in a recent meeting which brought together 50-60 refinery technical men together with a number of service-company personnel to pool their knowledge. Photos show chemical cleaning equipment at two refineries.

Chemical Cleaning Is Cheaper, Too

It can't do all the cleaning jobs in a refinery, but those it can do are increasing in number, and at a worth-while savings

Edited by John C. Reidel
Journal Staff

CHEMICAL cleaning cannot do all the cleaning jobs around the refinery or chemical plant. But it is being applied on an increasing scale. Where it is applicable, it often results in direct money savings and in further savings through reduction of down time.

● Records on typical heat-exchanger cleaning jobs, ranging from crude-unit exchangers to slurry and M.E.K. exchangers, show that tube-side deposits have been removed chemically at a cost of $50 to $300 per unit. Exact cost depends on the number of units, their size, and the type of deposit present.

● Shell-side (product) deposits run higher—from a minimum of $180 to $500—because of the large volumes on this side and because alternate stages of different types of chemicals are usually required.

● Other tubular data are given here covering types of deposits encountered and resumes of actual jobs and methods used. Sketches of typical piping hookups for chemical cleaning are included.

● Current experience is given on a wide variety of units ranging from crude distillation to isomerization in both the heavy-oils and light-oil divisions of the refinery. This is taken from a recent refinery chemical cleaning symposium.

Finally, notes are included on these equipment-design improvements to facilitate chemical cleaning: (1) elimination of nonfilling features; (2) provision of 1½-in. drain and vent ports on channel head and shell nozzles; and (3) specification of ferrous metals resistant to chemicals—particularly in bolts, baffles, and tie rods.

TYPES OF DEPOSITS
(Shell-and-Tube Equipment)

Table 1 is an analysis of deposits normally found in refinery heat-exchange equipment. These deposits for which chemical methods can be effective may be classed as follows:

Water Side

1. Carbonates.
2. Silicates.
3. Oxides.
4. Phosphates.
5. Organic (algae and bacteria).

Product Side

1. Oil.
2. Partially carbonized oil.
3. Crude salts.
4. Sulfides and oxides.
5. Residues from special processes.

(a) HF sludge (HF alkylation).

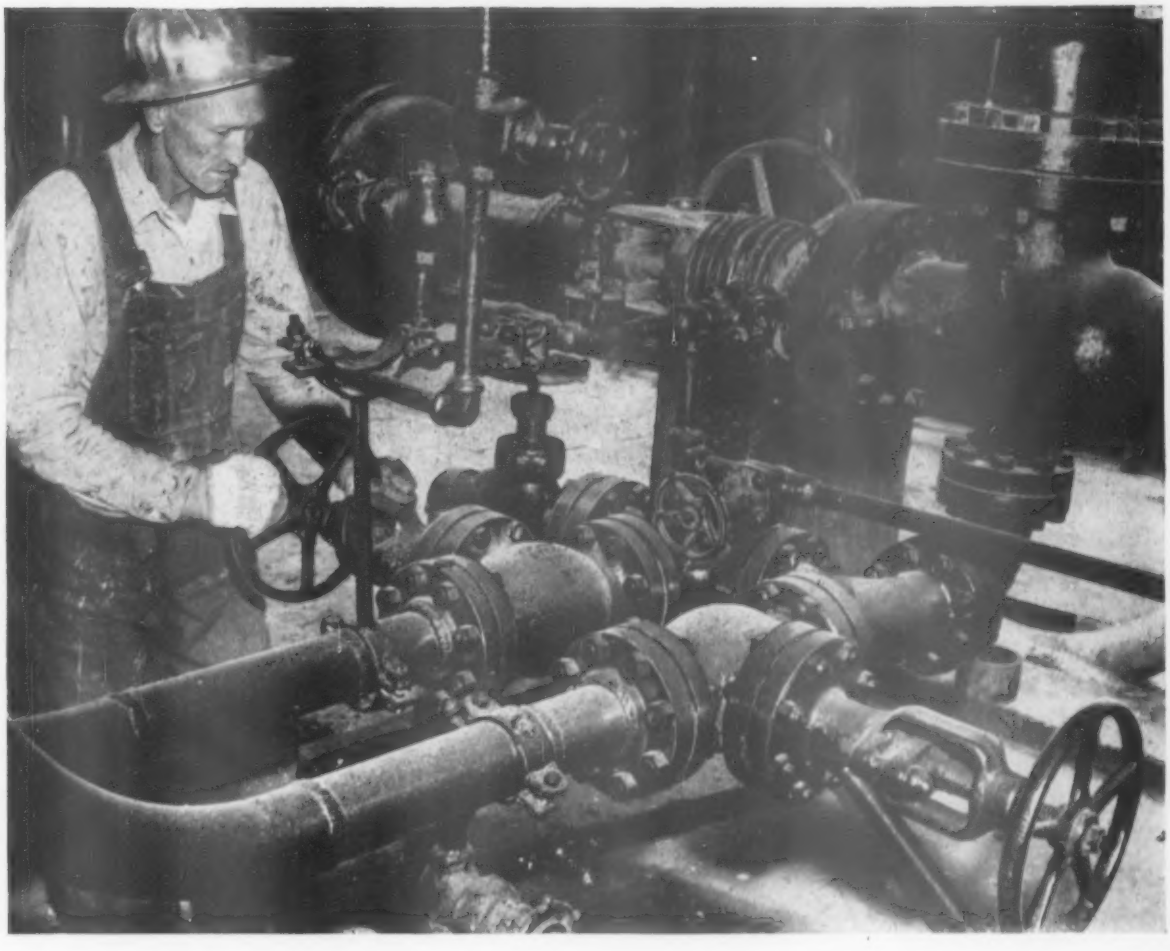
(b) Antimony trichloride and aluminum chlorides (butane isomerization).

(c) Ferro-ferri-cyanide (vapor-recovery systems).

(d) H_2SO_4 residues (H_2SO_4 alkylation).

(e) Catalyst fines (cat crackers).

Chemical cleaning jobs . . . Tables 2



They're saving with these Crane valves on 850° F. draw-off service

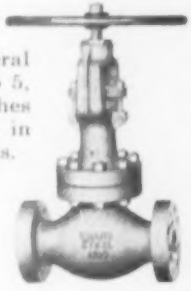
THE CASE HISTORY—What does it cost to keep a valve working? The answer can vary widely—as the DX-Sunray Oil Co. knows after long experience with Crane maintenance-saving valves.

For instance, take the 3-inch, 600-pound cast steel valves shown here. These No. 171X Crane globes were installed in 1945 on draw-off lines from reaction chamber. They handle oil at 850° F.

In 9 years' continuous service with frequent operation, these valves have cost no more than simple routine maintenance. They've shown no leakage, given no trouble of any kind. They're still as dependable as new.

Outwardly Crane valves look like many others. The difference that's important to you is mainly inside. It's in Crane's greater skill and care in casting steel—in developing Exelloy seating—in operating design—and in Crane's way of testing valves. That's why they give extra long, low-cost service.

Crane offers you complete selection in steel gate, globe, angle and check valves in all pressure classes—in sizes up to 24 inches. For valuable help in specifying and ordering, call your local Crane Representative.



Crane Co., General Offices: Chicago 5, Illinois. Branches and Wholesalers in all industrial areas.

CRANE CO.

VALVES • FITTINGS • PIPE
KITCHENS • PLUMBING • HEATING

CRANE'S FIRST CENTURY...1855-1955

TABLE 1—TYPICAL DEPOSITS ENCOUNTERED IN REFINERY HEAT-EXCHANGE VESSELS ON WHICH CHEMICAL CLEANING CAN BE EFFECTIVE

Type unit—	Deposit	Remarks
Crude distillation, bottoms exchangers, shell-side (feed).	⅛-in. black, oily, composed mainly of magnetic iron oxide, ferric oxide, organics, a few phosphates and silicates, and lots of iron sulfide.	This is typical of residual deposit encountered in crude distillation and topping processes, or where crude has not yet been subjected to cracking temperatures.
Crude distillation, gasoline, naphtha and kerosine overhead condensers, shell-side.	Flake deposit consisting of iron oxide and sulfide, with little organic.	Typical of fractionating column overhead products formed in crude distillation, cracking, and vapor-recovery operations. Sometimes cupric sulfide and iron disulfide will be found in these.
Overhead and side-product condensers and coolers, tube (water) side.	Dead algae from cooling tower, iron oxide, oil from contamination, carbonates, silica or silicates, phosphates, etc., from plant cooling-water treatment chemicals.	Just about any combination of these can be expected on water side.

TABLE 2—TYPICAL CHEMICAL CLEANING JOBS—CONDENSERS, COOLERS, EXCHANGERS

Type units—	Purpose of cleaning	Method	Results and remarks
Catalytic cracker, gasoline condenser.	To remove water deposits from tube side composed of: 22 per cent organic 50 per cent iron oxide 10 per cent phosphates 12 per cent silicates 6 per cent calcium sulfate	1. Hot alkaline-detergent solvent to remove organic and disintegrate silicate and sulfate. 2. Heated inhibited HCl acid to dissolve oxides and phosphates.	Gasoline temperature to storage: Before 125° F., After 90° F.
Debutanizer overhead, condensers in vapor-recovery plant.	To remove water deposits from tube side while units were in operation 15 per cent organic 10 per cent silica 3 per cent sulfates Heavy iron oxides	1. Alkaline-detergent solvent injected to remove algae and mud. 2. Concentrated inhibited HCl acid injected into water-inlet header.	Before / After Transfer coefficient: 40.8 / 58.5 Water rate, g.p.m.: 229 / 343 Reflux temperature, °F.: 152 / 101 Reflux drum pressure, psi.: 92 / 70
Bottoms to crude feed exchangers and pancake coils in crude-distillation unit.	To remove deposits from tube side composed of: 48 per cent organic (oil) 35 per cent crude salts Remainder iron oxide and iron sulfide	1. Degrease with hot kerosine-alkaline emulsion. 2. Heated alkaline-oxidation solvent to disintegrate partially carbonized fraction. 3. Heated inhibited HCl acid to remove iron oxide and sulfide.	Due to design features of pancake coils, no other method was possible. Effect of treatment was an increased throughput of 5,000 bbl. per day.
Griscolm-Russell sections in heavy-naphtha cooling service.	To remove product deposits from tube side composed of: 10 per cent organic Heavy CuS 20 per cent FeS	1. Hot alkaline-oxidizing solvent to dissolve copper compound. 2. Heated inhibited HCl with reducing agent to remove oxidized compounds and iron sulfide.	Very satisfactory results. Previous approach had been to pass superheated steam through tubes and then shock with water spray on outside. This was severe on units, causing distortion and warping.*

*Loose material also caused operating troubles later. These troubles were avoided by successful chemical cleaning methods.

TABLE 3—TYPICAL CLEANING JOBS—COLUMNS

Type of service—	Purpose of cleaning	Method	Results
51 by 4-ft. dia. gasoline.	One tray plugged. Thin black flakes 1 mm. thick composed of: 23 per cent oil and organic 55 per cent iron oxide 22 per cent iron sulfide	1. Oil and organic fractions removed with a hot alkaline-oxidizing solvent. 2. Heated inhibited HCl solvent.	Tray, caps, and downcomers clean.
86 by 3-ft. dia. propane fractionating tower. Fifty-bubble-cap trays.	Brown, crumbly deposit up to ¾-in. thick composed of iron oxide and sulfide.	1. Cascade-heated, inhibited HCl over trays, while draining to waste. 2. Close bottom drain valve and fill. Unit allowed to soak, intermittent agitation with gas.	Inspection showed unit to be clean.
60 by 3-ft. dia. absorber oil column.	Paraffin deposits around cap causing high velocity and carryover.	Alkaline solvent with wetting agent heated by injecting steam.	Paraffin removed, resulting in normal operating conditions.
100 by 5-ft. dia. propane rectifying column.	Cyanide deposits up to 3-in. thick on trays.	Alkaline solvent with wetting agent heated by injecting steam.	Deposits completely removed. Before treatment, tower was removing very little propane.
Vapor-recovery plant consisting of: 52 by 8-ft. still, 56 by 5-ft. absorber, 29 by 4-ft. stripper.	Oil, iron oxide and sulfide, and free sulfur.	1. Alkaline boilout with wetting agent. 2. Heated inhibited HCl soak.	Stripper and absorber columns clean. Patches of carbonized oil remaining in top tray of still.
Treater Raschig ring scrubber column.	Iron sulfide and caustic residues.	Heated inhibited HCl.	Pressure drop and capacity restored to normal.

Their Travel Is Five Times Safer

The SUPER 18 BEECHCRAFT is an airplane that can be purchased with confidence . . . not only in its ruggedness, reliability, and adaptability, but also with confidence that it will deliver the ultimate in comfortable air travel.

Statistics prove that corporation aircraft are more than FIVE TIMES safer than automobiles, measured by accident fatalities per 100 million occupant-miles.

Travel completely relaxed in your own transport at normal cruising speeds up to 215 miles per hour . . . with all the facilities for private consultation and deliberation while on the way on important missions.

The SUPER 18 pays dividends to any corporate activity by slashing travel time by as much as 75 per cent . . . by increasing business efficiency and by easing the demands of time upon the executive team.

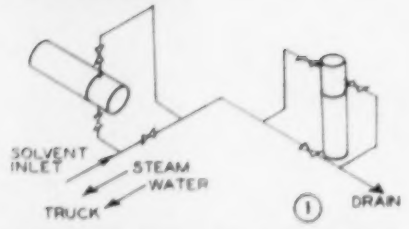
In the competitive business world of today, BEECHCRAFT ownership opens the way for business expansion . . . increases executive activity . . . *by saving time.* With a BEECHCRAFT, company executives have more time for business and more time for pleasure, too!

Please contact your BEECHCRAFT dealer or distributor, or write to Beech Aircraft Corporation, Wichita, Kansas.

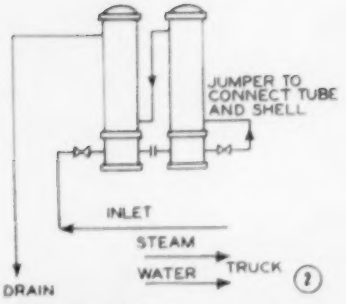
★ ASK ABOUT BEECHCRAFT'S NEW EXCLUSIVE LEASING PLAN.

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

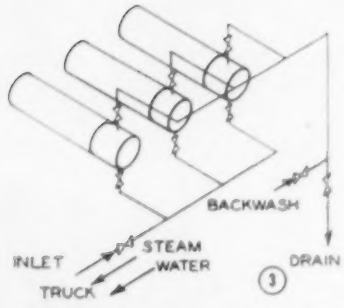
Shell-and-tube



SPEED CLEANING . . . Tie scattered units together on common header. Valves permit selection of only those units to be cleaned.



SAVE CHEMICALS . . . A chemical and money saver is this simple hookup which provides for cleaning both tube and shell sides in series.

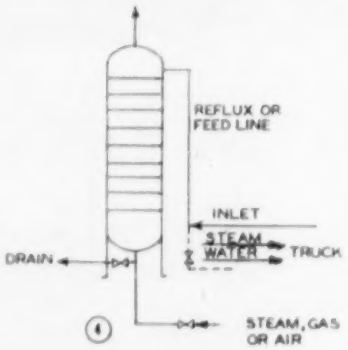


MANIFOLDING . . . Multiple units ganged together by manifolding. Valves permit positive circulation through each condenser.

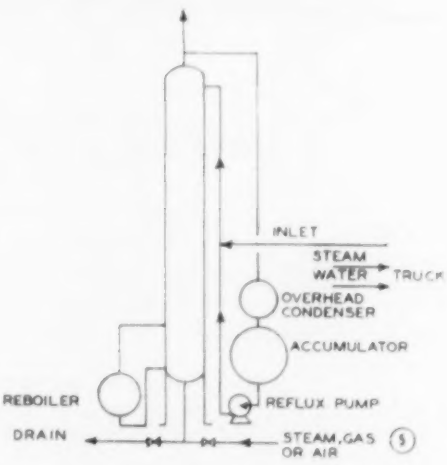
Tower cleaning

Hookup and procedure

SMALL TOWERS . . . For small towers and scrubbers, solvents are first cascaded through unit. After easily dissolved deposits are removed, unit is filled to allow solvent to react with remaining deposits. Existing pop line is usually used as vent.



LARGE TOWERS . . . For very large towers, the cascading method may be used entirely by providing a temporary suction from the tower bottom to the reflux pump. Fines are removed from trays during flushing by cascading water over top and agitating with steam, air, or gas from bottom. Associated vessels are easily included in circuit.



and 3 summarize some actual chemical cleaning jobs showing type of units cleaned, deposits, methods used, and results. Table 4 indicates how chemical cleaning is being extended to various types of process equipment. Figs. 1-5 show typical piping hookups for accomplishing chemical cleaning.

The solvents vary widely and are determined prior to the cleaning job by running and analyzing a solvent test on actual samples taken from the unit. Wetting and emulsifying agents will usually handle up to 10 per cent oil in the deposit. However, if this fraction is higher, a degreasing stage is applied so that the oxidizing or reducing solvents to follow will be able to contact the carbonized and inorganic fractions.

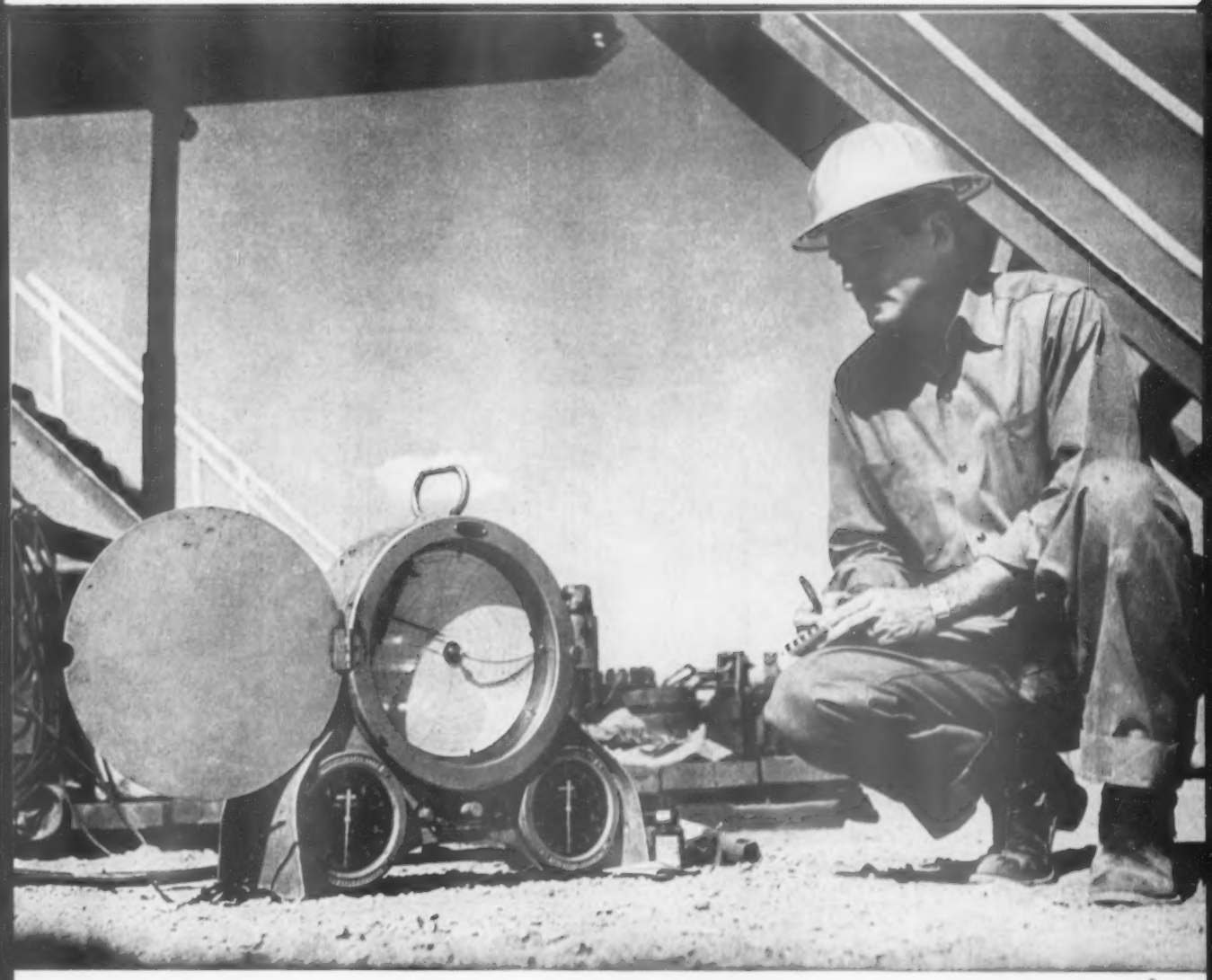
TABLE 4—TYPICAL REFINERY PROCESSES USING CHEMICAL CLEANING

Type process—	Equipment
Reforming units	Waste-heat boilers, gasoline condensers, compressors.
Alkylation	Bubble towers, refrigeration equipment.
Isomerization	HCl stripper, overhead condensers, accumulators, vent-gas scrubbers, catalyst removal column, deisobutanizer columns, deethanizer columns.
Polymerization	Catalyst warmer banks, product condensers.
Catalytic cracking	Surface condensers, gasoline condensers, waste-heat boilers, slurry exchangers, hot-oil pump gland system, gas-oil exchangers.
Crude distillation	Naphtha coolers, pancake coils, crude feed exchangers.
Thermal cracking	Gasoline condensers, crude exchangers.
Stabilization and vapor recovery	Stabilizers, compressors, absorbers, flare and gas-supply lines to furnace burners.
Alkymer unit	Tanks, lines, etc.
Sulfuric-acid plant	Acid contact towers, waste-heat boilers.
Toluene unit	Rundown lines, towers, process lines, exchangers.
Heavy oils	Wax machines, open-box condensers, ammonia generators, sweating ovens, contact clay filter, jet condensers, caustic scrubbers.
Utility department	Economizers, water lines, boilers, boiler feed lines, filters.
Gas treating	Caustic tower.
Miscellaneous	Propane dewaxing stripper, propane stripper condensers, jet condensers.

More difficult . . . Here are the types of fouling generally more difficult and hence more costly to remove by chemical cleaning:

1. Polymerized deposits.
2. Totally carbonized deposits (carbon or coke).
3. Calcium sulfate.
4. Iron disulfide (FeS_2).
5. Cupric sulfide.

These basic types of deposits are usually quite resistant to chemical cleaning and may require multiple stages of solvent to remove them. However, research is continuing on these and perhaps a single-stage method will be found for their removal. Research continues, for instance, on removal of sul-



ACID PETROFRAC

DOWELL double-duty treatment boosts flow two ways — fractures and acidizes in single operation

An Acid Petrofrac* treatment delivers a 1-2 punch in the pay zone—fracturing the formation and attacking it with acid simultaneously. Sand-carrying Acid Petrofrac has increased production more than 400 per cent above that of offset wells which have been either *fractured* or *acidized*.

Acid Petrofrac requires no excessive rig-time. Materials are mixed quickly and to a constant viscosity with specialized Dowell equipment. No gel breaker is needed after the treatment. Acid Petrofrac has retarded acid properties and excellent sand carrying ability—even at high temperatures.

The men and equipment of Dowell, and *only* Dowell, can apply Acid Petrofrac treatments to your well. Dowell Service means advanced laboratory research, engineers with wide field experience and modern, large-volume, high-pressure pumping equipment. Dowell Service brings you well treatments, job-tailored to your well conditions.

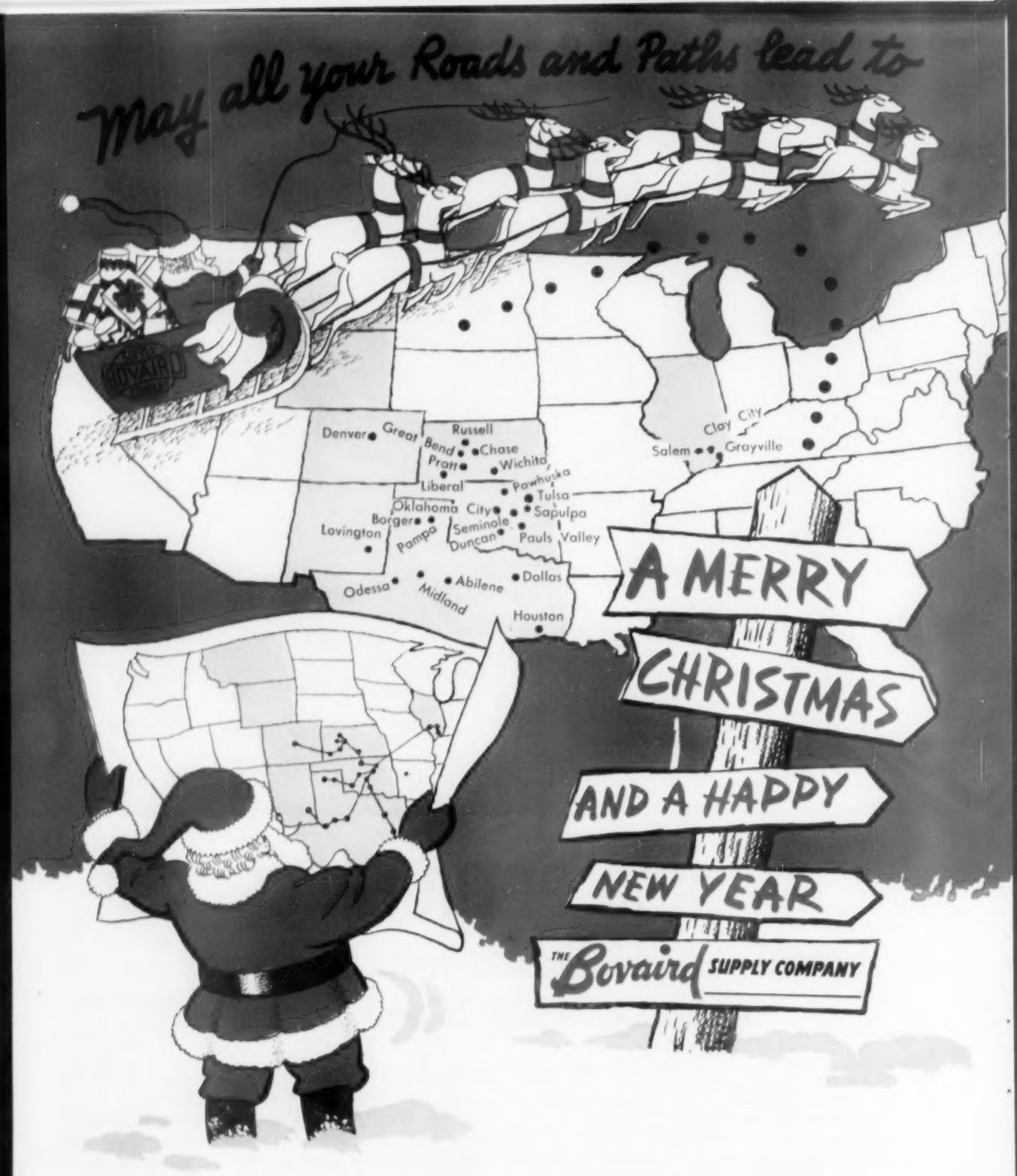
For service, or for more information, call any of the 165 Dowell offices in the United States and Canada; in Venezuela, contact United Oilwell Service. Or write Dowell Incorporated, Tulsa 1, Oklahoma, Department L-11.

*Service Mark of Dowell Incorporated

services for the oil industry

DOWELL

A SERVICE SUBSIDIARY OF THE DOW CHEMICAL COMPANY



THE Bovaird SUPPLY COMPANY

GENERAL OFFICES
TULSA, OKLAHOMA

84 YEARS OF PROGRESS WITH THE OIL INDUSTRY

fates and highly polymerized organics. Removal of such polymer deposits by controlled burning has been described elsewhere.[1] If these types are present in relatively smaller amounts, say up to 25 per cent, there is a good chance of removing them by disintegration provided the remaining deposit is soluble and is acting as a bonding agent.

Cost of Shell-and-Tube Cleaning

Costs of chemical cleaning will vary with the individual unit to be cleaned. Factors include the size of the unit, amount of scale, type of solvent used, and number of cleaning stages required. If a service company is employed to do the job, its charges will include cost of labor and use of cleaning equipment. Such costs can be minimized by cleaning a number of units at a time. Service companies may be in a position to make money-saving recommendations from their past experience.

Some refineries may decide to do their own chemical cleaning. Cost figures for one such refinery are given by Griswold and Thoen.[3]

HEAVY-OIL DIVISION

1. Crude Distillation

In addition to the water sides of condensing and cooling equipment, chemical methods have been successful in cleaning gasoline still columns and the product sides of gasoline, naphtha, and kerosine condensers.

Crude side . . . The cleaning of the crude side of crude preheaters can be outstanding in its effect on the increased performance of the unit. One example resulted in an increase of 5,000 bbl. per day throughput on a crude-distillation unit.

In a typical installation, a bottom or top exchanger or both may be encountered. It is a customary practice for the tower product to be fed through the tube sides of the unit. Deposits found here are usually removed by mechanical methods including washing, brushing, rodding, or a combination of these. The crude charge, however, is usually fed through the shell side of the exchangers and deposits here may include oil, water-soluble crude salts, some percentage of carbonized oil, and inorganic deposits such as iron oxide and iron sulfide.

Three-stage cleaning . . . Since the shell-side tube surfaces cannot be adequately reached by most mechanical means, chemicals will usually obtain better results in removing these deposits. However, it is not simple, since a minimum of three chemical stages is usually required. The first of these is a degreasing stage to remove the oil and particularly the oil film which coats the tube salt so that water can contact them and thereby dissolve them.

In the second stage, caustic fortified with oxidizing and wetting agents is commonly used to remove the polymerized oil fraction. Inhibited hydrochloric acid is then used to remove the hard, intact iron oxide and iron sulfide deposits next to the tube metal. This third stage may or may not be followed by a soda-ash neutralizing stage to prevent the after-rusting which may take place when air contacts clean metal surfaces before the unit goes back on stream. Simply flushing with normal cooling water will accomplish neutralization.

2. Pipe Stills

Experience around pipe stills is fairly limited. Nearly all operate at or above a temperature high enough to form coke or carbon, and as yet no practical or economical solvent has been found for the successful removal of this type deposit.

On a few occasions, furnace tubes have been cleaned with high-pressure-jetting methods. But, when hard-coke formations are present—as they usually are—there doesn't seem to be a substitute for the old reliable air-operated turbine or cutters.

Several times, a few thousand feet of 6-in. sour-crude lines which carry the charge to the pipe still have been cleaned. In the case of the prefractionating condensers and overhead condensers, outstanding work has been done in the cleaning of the water side while the units were kept in operation. This cleaning in operation can be of great value to the operator. The overhead vapor condensers are critical in that they will foul up on the water side long before the end of the normal run is reached. By cutting back on the charge rate and the cooling-water flow, concentrated inhibited hydrochloric acid can be injected into the water stream upstream from the condenser. If this condition is maintained for about 20 minutes, unit will come back to normal operating conditions.

This is strictly an emergency procedure and is not recommended unless the operator is willing to take a calculated risk—for if any leaks are developed between the product and water side, the unit will have to be brought off stream.

However, if the unit is in good mechanical condition, the chances of continuing to operate the unit for several months makes the risk worth while. In one case, cleaning of the overhead vapor condensers dropped the pressure on the deisobutanizer column from 92 psi. back to 70 psi. In addition it increased the throughput on the unit from 63,000 to 70,000 bbl. per day with the added advantage that the unit was kept in operation until its normal scheduled shutdown.

3. Lube-Oil Plant

Work here has been confined to cleaning refrigeration equipment, particularly ammonia condensers and propane dewaxing condensers.

Ammonia condensers . . . Operating conditions in ammonia condensers frequently result in the formation of concentration cells under iron oxide deposits. This may then result in pitting-type corrosion. In such cases, the tubes may undergo severe localized attack even though the remainder of the tube surfaces may be relatively unharmed.

In the case of such pitting, mechanical methods will open the tubes all right, but they will not remove the deposits from the pits. These will remain to continue an active corrosive condition in the base of the pit until finally the pit will extend completely through the tube, at which time it is necessary to retube the unit. Most refinery people have seen this action. Chemical solvents, by removing the deposit from the pits, arrest further corrosion and so prolong the life of the unit.

There are several cases where the life of ammonia condensing systems has been extended by several years. Before chemical cleaning, these units were headed for the scrap heap in a very short time.

Dewaxing condensers . . . In the case of propane-dewaxing diluent condensers, deposits are removed from water side. But also detrimental to heat transfer is a buildup of organic deposits on the shell side. These can also be removed chemically so that original operating efficiencies again can be obtained.

4. Thermal Cracking Unit

Work here has been confined to the removal of water deposits from condensing equipment. Of particular value is the cleaning of gasoline condensers and coolers. Because of poor cooling resulting from a buildup of water deposits in one plant, gasoline was going to storage tanks at a temperature of 125° F. This resulted in a high loss of gasoline through vaporization at the storage tank.

Cleaning these units resulted in a final rundown temperature of 90° F. The savings in gasoline formerly lost through vaporization offset many times over the actual cost of the cleaning operations.

LIGHT-OIL DIVISION

1. Cat Cracker

The cat cracker offers many possibilities for the use of chemical cleaning.

The following list covers those which are most common: flue gas and slurry boilers; slurry exchangers; catalyst blower-turbine surface condensers; gasoline condensers, hot-oil-pump gland water system, and hydraulic-oil control piping.

Waste-heat boilers . . . Most utility departments are hard pressed to furnish adequate amounts of steam to keep up with refinery demands. Therefore, the steam generated by cat cracker waste-heat boilers is in many cases of considerable value to the utilities department.

It has been found that it can be very difficult for refinery operators to keep oil from contaminating their waste-heat-boiler feed water. The source of this oil is usually from steam-operated pump condensate. When such condensate is returned to the boiler cycle, the oil can be deposited in the boiler where it acts as a deterrent to heat transfer. The oil, along with normal feed-water deposits, will eventually build up to a point where cleaning is warranted. Due to equipment design, chemical cleaning is often the only means for tackling this job.

If considerable oil is present, acid alone may not achieve satisfactory results. In some cases it has been found necessary to precede the acid cleaning with an alkaline boilout. This is usually done right at the end of the run while the units still have steam pressure.

Caustic and soda ash or a mixture of the two is injected into the feed water when the steam-generation unit has been stopped. This solution is allowed to soak in the boilers while they undergo normal depressuring through cooling. But the solution is drained while still hot, say about 220° F. This usually removes the oil residues so that when the acid stage is applied, better contact with the inorganic deposits is obtained. This procedure is also beneficial when appreciable amounts of silicates are present in the deposit.

Slurry exchanger . . . Deposits will sometimes yield to chemical method. However, the cleaning of any particular set of exchangers should be preceded by a very close and thorough analysis of the deposits. Those which run 90 per cent organic material can be very hard to clean. Those which may run 50 per cent organic and 50 per cent inorganic have been successfully cleaned. These deposits are tough because it seems that they operate at temperatures where partial cracking occurs to form carbonized material. Also, according to the nature of the crude feed, gums and waxes are deposited and these may require different types of solvents.

Crude-oil residues and the gums and waxes mentioned above can be removed, in most cases, by piping the hot gas-oil cut from the fractionating column at about 380° F. through the crude side of the slurry exchangers. This is done at the end of the run while the cat cracker is still in operation.

Taking each of the exchanger units one by one, the crude valve is blocked at the exchanger and a ¾-in. line tapped into one of the shell nozzles to furnish the gas oil. The slurry flow is retained through the other side. The gas oil continues on to the reactor and is, of course, eventually recovered again at the fractionator. This procedure on two known occasions cleaned the units so completely that no further action was required. However, in most cases, deposits of iron and iron sulfide will remain and eventually will require an acid for removal.

Catalyst - blower - turbine surface condensers . . . It is not uncommon any more to see operators strive for 18 months or 2 years of operation before bringing down a cat cracker for a clean-out. One of the things that can prevent a run of this length is the surface condenser on the catalyst blower. If the condenser fouls up, the steam-turbine drive will no longer have enough vacuum to keep the blower up to rated speed.

In those cases where two or more cat crackers are arranged in parallel flow, it is sometimes possible to have one surface condenser carry the load of both cat crackers at a reduced charge rate. This condition need be maintained for only a few hours while the other condenser is being chemically cleaned. Of course; here again a calculated risk must be taken that leaks will not develop. In one case, the vacuum on the surface condenser had dropped to 17 in. Hg. By the above procedure, the vacuum was restored to 26 in. This permitted the extension of on-stream time by 12 months.

Gasoline condensers . . . Every cat cracker has 10 or 12 of these units, and mechanically cleaning then can take several days or a week. With chemical methods, this work has been done in 1 day, leaving the time saved to make mechanical repairs.

(Reported experience): "About 10 years ago we brought a cat cracker down to be chemically cleaned. It took about 8 weeks to get back on the stream. This was our first job with a service company. The cleaning was successful in that we removed the deposits. But we failed to mention that some of the exchangers were equipped with aluminum tubes. The acid cleaning, of course, removed these tubes. As we say, we had not mentioned it nor had they asked. My point is that you should be sure to discuss all materials and equipment with the service-company representative. We have gone along on a few more experimental jobs and have found that the cleaning of shell-side exchangers is a rough proposition."

Hydraulic-oil control piping . . . Rust and sludge will sometimes form and lodge in control diaphragm orifices, thereby creating valve switching and automatic control difficulties. Chemicals again are ideal for removing these deposits from a complicated piping system such as this.

2. Vapor Recovery

Widespread use of chemical cleaning can be found in vapor-recovery plant operations. A typical job consists of cleaning: (a) deethanizer, debutanizer, depropanizer, and absorber columns along with low and high-pressure gasoline stills; (b) both sides of shell-and-tube vessels, reflux, vapor and water lines; (c) compressor jackets; and (d) gas and flare lines for the removal of sulfur deposits.

(Reported experience): "So far as we are concerned, chemical cleaning is the answer to reducing maintenance costs and labor. About 10 years ago we started in on an overhead condenser at our plant, various units on the cat cracker, water side of alkylation exchangers, mixed absorber towers, vapor-recovery units.

"We had an absorber tower which was really full of trash. We first used shovels to try to clean it. We finally turned to chemical cleaning. A sample analysis was made. Saturday the absorber was washed down with caustic and a wetting agent. The absorber was acid-cleaned on Sunday. Monday morning the absorber was as clean as a whistle—nothing in it. We don't know how long it would have taken to clean it mechanically, but this way was very successful.

"We never bother now to do anything in the way of mechanical cleaning of vapor-recovery units. What used to take 2 weeks with about all the pipe fitters we had (60 to 80) in tearing down and getting units clean, we now do with about 20 to 30 pipe fitters. And we get a much better job and save a lot of time. We work around the clock. There just isn't any comparison. Do you completely fill the tower? Yes. Do you circulate? No, just let it set."

3. Alkylation

In the sulfuric-acid alkylation process, primary concern has been with the cleaning of ammonia condensers,

INTRODUCING

Magcobar G-7 SUPER-WEIGHT

The Oil Industry's First Field-Proved Weighting Material for Making 30 lb. Mud

for extreme high pressures or emergency use only
100 POUN
G-7
SUPER-WEIGHT
FOR MAKING 30#/GAL. MUD TO USE IN THE CONTROL OF HIGH PRESSURE EMERGENCIES
Magcobar

For the first time, a **field-proved** 30 lbs./gal. mud is available to the oil industry! This mud, Magcobar G-7 Super-Weight, was first used successfully nearly a year ago to control extremely high subsurface pressures under emergency conditions. Since that time other extremely high pressure wells have been successfully controlled with Magcobar G-7.

Magcobar G-7 Super-Weight is a finely ground product with an unusually high specific gravity (7.0) and is suited for preparation of extremely high weight muds in the range of 26-32 lbs./gal. It has a particle size of 70% through 325 mesh. It is a charcoal colored free-flowing powder which is easily mixed through a jet hopper mixer.

G-7 Super-Weight muds can be used under these or similar conditions:

a. Working over high pressure wells, in which tubing or casing failure has occurred relatively near the surface.

b. Emergency situations in drilling wells, where a critical mud weight balance exists between an upper loss zone and a lower high pressure zone.

c. Blow-out wells, in which the normal blow-out prevention procedures have failed or are not economically practical.

The preparation of special high weight muds with Magcobar G-7 requires considerable care in that a balance between support of weighting material and viscosity for pumpability must be maintained through the correct quantity of low gravity solids.

MAGCOBAR G-7 IS NOT RECOMMENDED FOR USE IN THE NORMAL DRILLING OPERATION. If you have an emergency drilling condition that cannot be safely controlled with regular 20 lbs./gal. Magcobar muds, it is recommended that you contact your Magcobar field engineer for specific study and recommendations for your problem. A stock of Magcobar G-7 is maintained at New Orleans, Louisiana, and is available from this stock through all Magcobar dealers.

Magcobar
Complete
DRILLING MUD SERVICE

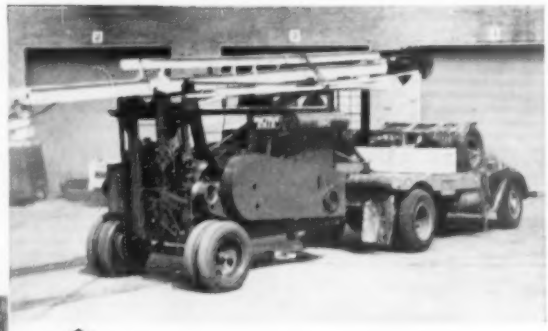
MAGNET COVE BARIUM CORPORATION

HOUSTON, TEXAS

WHEREVER YOU'RE LOCATED

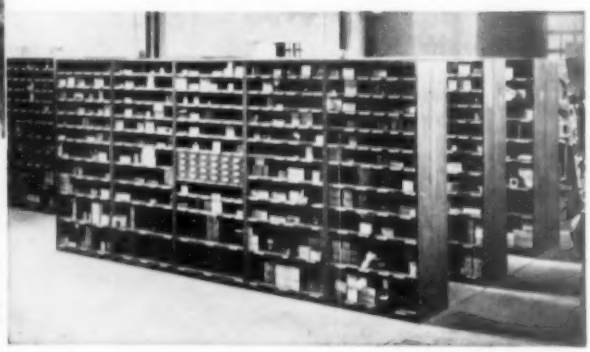
there's a Bucyrus-Erie spudder distributor nearby

Here's an up-to-date list of Bucyrus-Erie spudder distributors, located throughout the United States and Canada, who are ready to fill your equipment needs. Check for the name of the distributor nearest you. Then see him soon for details on how Bucyrus-Erie spudders can save you money on your drilling and well servicing jobs.



SALES. Your Bucyrus-Erie distributor carries the world's most modern and complete spudder line. Four models: 60-L, 28-L, 36-L, 48-L; maximum drilling depth, 6000 ft.; servicing, 7000 ft.

SERVICE. Chances are your Bucyrus-Erie distributor began years ago in the drilling business himself. He knows drilling procedures inside and out. Extensive personal experience qualifies him to recommend tools and equipment to you.



PARTS. Whenever and wherever you need tools or parts service, you needn't look far for help. There are 38 distributor outlets for Bucyrus-Erie spudders located in all principal oil fields of America. Each distributor has the facilities and parts inventories to keep your rig in top running condition.

Write, Wire or Phone

BEACON SUPPLY CO.	Pampa and Borger, Tex.
BECKWITH MACHINERY CO.	Pittsburgh (East Liberty), Erie, Bradford and Clearfield, Pa.
BUCKEYE SUPPLY CO.	Zanesville and Wooster, Ohio; Wichita, Chase, Arkansas City and El Dorado, Kan.
CABLE TOOL SUPPLY CO.	Princeton, Ind.
DRILLERS SUPPLY CO.	Joplin, Mo.
DRILLING AND MINING EQUIPMENT CO.	Los Angeles, Calif.
GREAT NORTHERN TOOL & SUPPLY CO.	Billings, Cut Bank and Kevin, Mont.; Casper, Wyo.
IVERSON SUPPLY CO.	Tulsa, Oklahoma City and Okmulgee, Okla.; Ft. Worth., Midland, Odessa and Snyder, Tex.; Artesia and Farmington, N.M.
McJUNKIN CORPORATION	Charleston and Hamlin, W. Va.; Allen and Pikeville, Ky.
OLYMPIC SUPPLY CO.	Seattle, Wash.
THE STRAKER SUPPLY	Mt. Pleasant, Mich.

CANADA

LUCEY CANADIAN SUPPLY CO.	Calgary and Edmonton, Alba.
NEWFOUNDLAND TRACTOR & EQUIPMENT CO.	St. Johns, Nfld.
TILLSONBURG PIPE & SUPPLY CO.	Tillsonburg, Ont.

21555

BUCYRUS ERIE

SOUTH MILWAUKEE WISCONSIN

DISTRICT SALES OFFICES
Evansville, Ind. • Dallas, Tex. • Englewood, N. J.

Stratco contactors, shell-and-tube vessels, deisobutanizer, and depropanizer columns.

Stratco contactors . . . These accumulate quantities of sulfuric-acid sludge which must be removed from the contactor upon cleanout. If this is performed in the usual manner by washing with water, the resulting dilute solution of sulfuric acid becomes quite corrosive, particularly to the agitator shaft bearing in the bottom of the contactor. On occasion, inhibited water has been applied so that when the dilute acid formed, the inhibitor prevented any attack upon the steel parts.

Acid stripper and regenerator columns . . . In the HF alkylation process, these are frequently cleaned with chemicals. Even though the system may be purged with ammonia, pileups of material containing dangerous HF acid may remain on trays. Acid cleaning followed by alkaline neutralization allows mechanical repairs and inspections to be made with complete safety.

(Reported experience): "We put an HF alkylation unit into standby for 5 years. But we couldn't keep it dry due to the high humidity. This resulted in the formation of dilute acid which was very corrosive to the system.

"About 240,000 gal. of dilute acid solvent circulated through both sides of the units. This was followed with a water wash and hot soda-ash solution. The plant was offstream for 4 years following this cleaning. When they opened the units to put back into operation, they were found to be in good shape. We now chemically clean three towers in our HF alky plant at each shutdown. We have found that mechanical cleaning just will not remove all the deposits. Mechanical cleaning takes 4 days—chemical cleaning takes 36 hours."

4. Butane Isomerization

While the volume of work done in isomerization units has not been large, what is being done illustrates again the value of chemical cleaning to remove toxic compounds in order to facilitate better and safer mechanical repairs and inspections. These are aluminum chloride and antimony trichloride deposits which usually will be found in the HCl stripper and the catalyst-removal columns. The deisobutanizer column, usually associated with butane isomerization, is a natural for chemical cleaning. The deposits are usually iron oxide and iron sulfide. But since they are usually too large to fill, cleaning must be done by the cascade method.

5. Catalytic Reforming

Experience with catalytic reforming units shows that the heaters are prone to form both iron sulfide and disulfide. The latter can be converted to a sulfide which can be removed by chemical cleaning.

A refinery recently cleaned the furnace on an Ultraformer. The job consisted of cleaning the coils in three furnaces and the transfer line to the reactors. The worst problem in approaching this job was the disposal of the large amounts of hydrogen sulfide gas which were liberated during the reaction. This was handled by running the vent lines to the burners of an adjoining furnace and burning these gases. In the initial design and construction of the unit, no provision was made for cleaning. As a result, it has been quite a job to install adequate fill and vent connections.

Cleaning pendant-type coils . . . The question has been raised as to whether or not pendant-type heater coils can be cleaned. The answer is that it is thought possible. The problem seems to be: (1) whether or not the acid gets into the tube elements in the first place; (2) whether or not it can be removed; and (3) whether or not the system can be neutralized.

The plan is to take one furnace at a time and tie into the header and pump through six rows of tubes. However, enough volume cannot be obtained with present pumps to insure positive flow through each tube.

This problem has been studied by building a glass model and circulating water containing a dye. The way it seems to work out when there are parallel flow arrangements is that the uptube element will fill to the top bend and cascade through the downtube side of each element. After pumping in one direction for a period of time, plans are to reverse inlet and outlet headers in order to contact both sides of the tube elements. There is reason to believe that this procedure will have a chance of doing the job.

Mechanical cleaning is almost ruled out of the picture because of the offstream time which would be required for this method. Therefore, all possible effort is being made to find a good chemical cleaning method.

TANK AND LINE CLEANING

1. Tank Cleaning

In the last year or two an increasing number of large tanks have been cleaned. These have been crude tanks, Bunker C, gasoline tanks, and jet-fuel tanks. Some of the primary reasons for getting into this type of work are:

1. Inspection—In some cases it has been necessary to clean the tanks quite thoroughly so refinery personnel could inspect them to see that they were in good shape to continue in service.

2. Product change seems to be another major reason. This is where a tank might have been in black-oil storage and it is desired to change it to a light-product storage. The black-product film would throw the light product off color specification.

3. To remove contamination—This problem has come up more and more in the petrochemical industry where many times the product requires high purity. For example, alcohol destined for pharmaceutical purposes. Any loose rust, sloughed mill scale, or fabrication dirt and oils can cause contamination.

Preparation . . . Most tanks require considerable amounts of steam and water. Air movers or blowers are usually required to maintain a fume-free atmosphere inside the tank. Since tank work is usually done on a 24-hour basis, lighting facilities are required which may need the running of temporary electric supplies.

Disposal is generally handled by digging a pit within the tank dike area and burying all liquids and residues removed.

Safety precautions demand that the tank and equipment be grounded and bonded to prevent static differentials from building up. The tank must first be tested for explosive vapors, then periodic tests must be conducted during the cleaning operation. In most cases, it seems to be good practice to maintain a high humidity condition inside the tank so that static charges will be conducted from the atmosphere.

A spraying device has been developed which is called a tank gun. This is set up in the center of the tank on the floor and rotated by means of an external hydraulic-drive unit. It gives a horizontal and an elevation traverse that permits the application of solvent to almost every square foot of internal surface.

Once started, the actual cleaning operation is a continuous procedure where different types of solvents are applied in succession for the particular job. If after-rusting is a problem, the cleaning can be followed with a passivation treatment.

When chemical methods are applicable, the results are usually (1) savings in time, (2) savings in labor force, (3) a better job, and (4) lower cost. In many cases, costs for chemical cleaning are no more than what scaffolding would cost if the tanks were to be cleaned by hand.

Cost of removing scale . . . There have been several jobs for removing the iron

oxide from the outside of new tanks prior to painting. This method might be used when a tank is located in a gaseous area where sand blasting could not be used because of the danger of sparks. The method of application must be worked out for each individual job. It is possible to leave a good, gray, steel surface that will retain passivation through several rains, frost, etc., and still give a good surface for painting. Preliminary information indicates that it may be possible to remove rust scale from new tanks for 6 to 8 cents per square foot. The removal of mill scale from new tanks usually proves more difficult and may therefore be more expensive.

2. Line Cleaning

There are three basic methods for cleaning lines. These may be: (1) filling and soaking or circulating with a solvent; (2) jet cleaning with high-velocity streams of water; and (3) cleaning with pipeline pigs.

(Reported experience): "It is surprising how many times you can clean a short piece of pipe at a cost of a few hundred dollars and thereby save thousands. We have one such job done for $300 where chemical cleaning was used on 8-in. lines in a still processing waxy material used as an lube-oil viscosity-improver additive. These lines were plugged down to a 2-in. level. The production savings were figured at $44,000. It would have taken us 3 weeks to shovel this material out. After chemical cleaning, we were back on the stream in 36 hours and had saved 1,000 bbl. of heating oil worth about $31,000. We pay very close attention to any savings we can realize. Incidentally, the question has been raised about disposal. We feel that the disposal of chemicals used in cleaning is only a drop in the bucket compared with all the fluids going into our sewer system."

3. Jetting

When deposits cannot be removed with chemicals, it is sometimes desirable to consider high-pressure hydraulic jetting. In plugged tubes, for example, there are cases where deposits have defied all attempts to remove them by drilling. Either the drill bits would break off or else the bit would drift through and penetrate the wall of the tube. These were later successfully cleaned with high-pressure jets. Pressure normally used is 3,500 to 4,000 psi. The jet nozzles themselves vary in size and configuration for the particular job. Cold water is usually used as a jetting medium.

(Reported experience): "We took 3½ days to clean 13 tubes with a mechanical turbine. A service company cleaned 1,067 tubes in 70 hours with their jet. This encouraged us to try jetting on furnace tubes, and it did not work out. However, we think there are many applications for jetting such as in air-preheaters, waste-heat-boiler tubes, and tubes equipped with welded U-bends."

4. Equipment Design

Generally speaking, there are not many complaints on towers and large vessels in regards to equipment design for easy chemical cleaning. Some features of exchanger design can and have been improved recently.

In the case of shell-and-tube equipment, here are some features which work against chemical cleaning methods.[5]

1. Nonfilling features. Designs such as indicated in Figs. 6, 7, and 8, create air or gas locks which make it virtually impossible to clean the top three or four rows because the outlet is lower than the tubes. With units of this design, a boss should be provided on the very top of the channel head or end plate to accommodate a 1½-in. pipe connection which could then be used for circulation instead of the outlet nozzle.

2. Small drain and vent ports. Past practice has usually been to incorporate ½ or ¾-in. drain and vent ports in the channel head nozzles. These are too small to treat through (many manufacturers realize this and are incorporating larger ports).

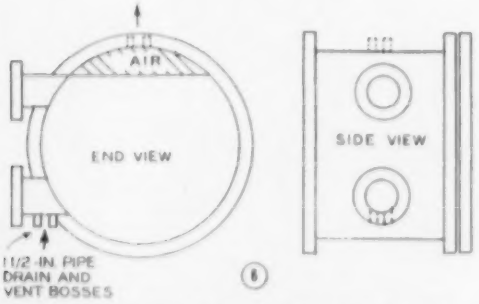
Ports which are too small hamper cleaning by:

(a) Restricting flow rates so that little benefit is obtained in the way of rapid circulation.

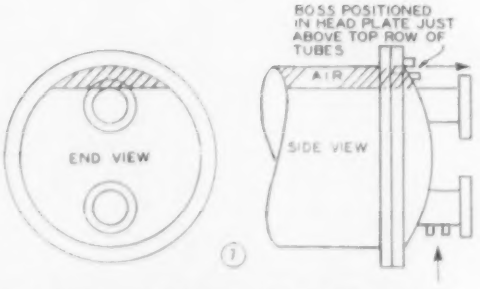
(b) Preventing units from being flushed adequately for the removal of loose residues.

(c) Lengthening time of treatment and thereby increasing the cost of chemical cleaning.

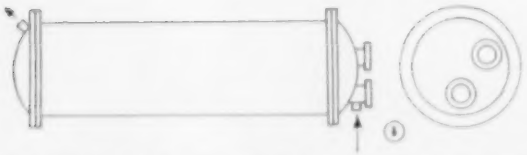
Bosses for channel-head nozzles should be adequate for 1½-in. ports for



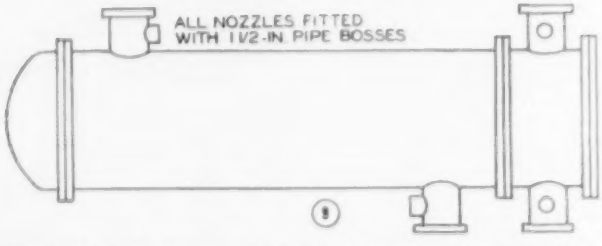
Shell-and-tube unit with removable tube bundle, showing nonfilling design and how it can be corrected.



Shell-and-tube unit with integral shell and tube sheet, showing nonfilling design and its correction.



Shell-and-tube vessel with multiple pass arrangement in which outlet nozzle is below other passes. Unit cannot be filled properly unless adequate provision is made at return head.



Typical shell-and-tube vessel adequately designed for chemical cleaning.

cleaning (Fig. 9). It is usually impractical to tie into the external piping because this is costly to the refiner. And it is often impossible because of maintenance work being done on valves or piping.

3. Poorly fitted tube-bundle baffles. With good fitting clearances, fluid follows flow as intended and much better results can be expected in the core section of the bundle. Baffles which do not closely fit the shell allow the fluid to flow only down the external surfaces of the bundle. Of course, close-fitting baffles are necessary for efficient operation as well as good chemical cleaning. It is suspected that loose fit is not so much the fault of the manufacturer. Rather, it may occur when installing replacement bundles.

4. Vertical mounting—channel head at bottom. Much loose material collects and builds up on the tube sheet up to the shell nozzle and cannot be flushed out. Refiners are more and more aware of the maintenance difficulties of such an installation, and mounting in this position is less frequently encountered. Hand-hole plates have been suggested, but these may be potential leak areas. Cleaning methods combining agitation and flooding can remove much of the piled-up material but cannot be completely successful.

5. Materials of construction. Use of many common solvents may be restricted when dealing with aluminum and zinc-coated tubes.

Also there is evidence of chlorides causing intergranular corrosion when using HCl. However, it is important to note that it is not the use of HCl per se which causes the corrosion. When hydrochloric acid is employed on stainless steels, it must be completely flushed.[7]

Inhibited dilute sulfuric, sulfamic, and phosphoric acids are used by one service company on stainless-steel-equipped units whose design is such that they cannot be completely flushed. In some cases where the entire system, including piping, is stainless (no carbon steel in the system), this company has used 20-40 per cent nitric due to the passivating effect of the nitric acid on stainless steel.[7]

Aluminum-coated tubes can be cleaned with sulfuric and phosphoric as well as chromic acids. Zinc-coated tubes are confined to the use of chromic acid. Special care must be taken to preserve the coating. Some progress has been made in the use of weak alkaline solvents on aluminum and zinc.

Free machining (S.A.E. 1115) bolts or similar material are not resistant to inhibited acids. Such bolts, running 0.16-0.23 per cent sulfur, are attacked by inhibited acids. But steel bolts with low sulfur content, about 0.02-0.06 per cent, are resistant. There is also some evidence that 4140 alloys used in pressure-vessel bolts are subject to failure, although these are low in sulfur.

References

1. Jelinek, F. R., "How Neches Butane Solves Tube-Bundle Cleaning Problems," The Oil and Gas Journal, October 26, 1953, p. 121 (deals with hard, brittle polymer deposits).

2. Farrar, G. L., "Chemical Cleaning of Refining Equipment," ibid., March 23, 1953, p. 211.

3. Griswold, T. N., and Thoen, J. O., "Chemical Cleaning . . . ," ibid., March 23, 1953, p. 236 (Continental Oil Co.'s experience with in-place cleaning. Includes some cost figures).

4. Prater, N. R., "Less Metal Loss from Chemical Treating," ibid., June 14, 1954, p. 134.

5. Reports from Dowell Incorporated, Tulsa.

6. Refinery Chemical Cleaning Symposium, August 19, 1955, Tulsa.

7. Rosene, R. B., Engle, T. P., and Floyd, G. L., "Effect of Several Mineral Acids on Stainless-Steel Equipment." A Dowell paper presented at annual water conference, Engineers Society of Western Pennsylvania, meeting held at Pittsburgh on October 17-19, 1955.

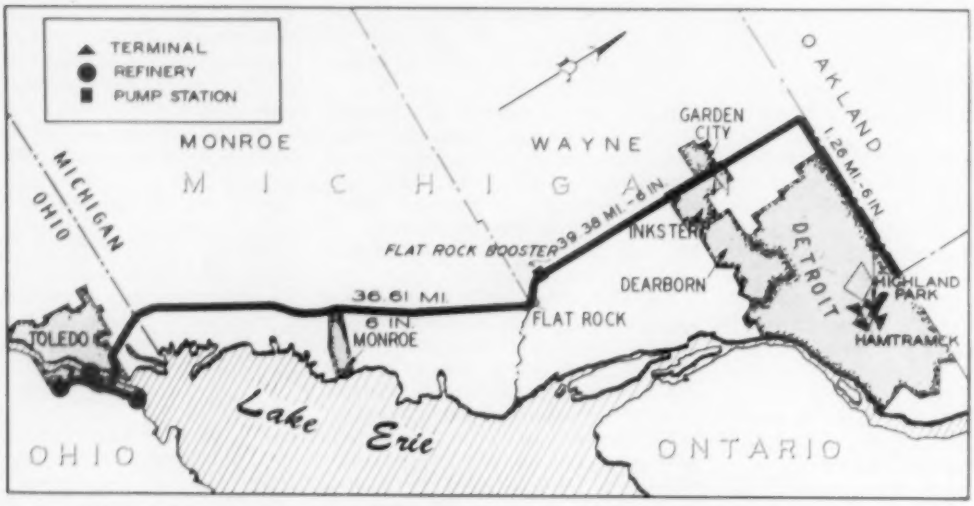
8. Thornton, D. P., "Three Musts in Chemical Cleaning," Petroleum Processing, March 1954, p. 359.

TULSA* TRUCK POWER WINCHES for HAULING!

Movement of this power shovel was made easily and quickly by a Texas trucking contractor with two truck-mounted Tulsa Winches. This is just another example of the versatility and reliability of Tulsa Winch. There is a Tulsa Winch for every make and model of truck and crawler tractor.

Tulsa* Winch
TULSA, OKLAHOMA DIVISION OF VICKERS Inc.

*Reg. U. S. Pat. Off.



ROUTE of Detroit Southern's products line which now has automatic booster at Flat Rock. Fig. 1.

Booster Station Goes Automatic

. . . . with both suction and discharge valves controlled

by Robert G. Deering
Assistant Pipeline Editor

AN automatic booster station with one control valve is common. But here's a station with both suction and discharge valves controlled. It's Detroit Southern Pipe Line Co.'s automatic booster station at Flat Rock, Mich.

In a recently completed modernization program the 20-year-old station was made fully automatic. A combination of circumstances made it necessary to have pneumatically controlled throttle valves on both suction and discharge.

The station is under start-stop control from the originating end, Toledo. But when the station is on line, Toledo has nothing to do with the operations—all controls function on local pressure changes.

Besides the two throttle valves, other interesting features of the station are the limited number of remote controls and shutdown devices and the complete absence of telemetered pressure and flow readings. Thought of the designers in laying out the station control system was that an economic balance between desirable and absolutely necessary items ruled out many things that are found on some automatic or remotely controlled stations.

The station is at about the midpoint on Detroit Southern's 77-mile, 6-in. products line from Toledo to Detroit (see Fig. 1). The line carries premium and house-brand gasoline and fuel oil. It generally operates around the clock, 7 days a week.

Basic equipment at the Flat Rock station is two 3-in., six-stage centrifugal pumps driven by 200-hp., 4,600-volt, 3,600-r.p.m. motors. The pumps are rated at 685 bbl. per hour at a differential of 480 psi.

For 20 years the station operated very well as a manned installation. But the new arrangement gives improved efficiency of line operation, smoother control of line pressures, and more economical use of personnel. The station is not completely unattended. One man remains to perform small maintenance jobs and to act as a standby operator in case any trouble develops with the automatic equipment. So far the system has given no trouble.

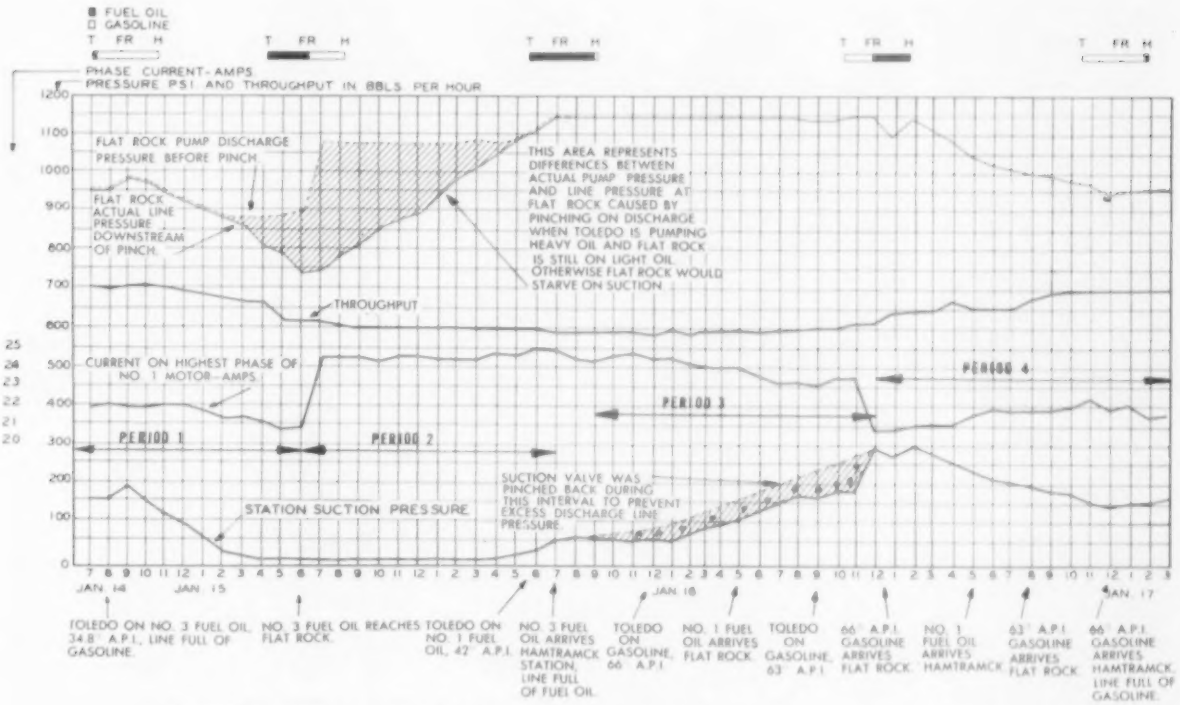
Suction-discharge controls . . . A look at the pressure profile in Fig. 2 will help explain why both suction and discharge controls are needed. This is a plot of readings taken at Flat Rock during a pumping cycle of gasoline-fuel oil-gasoline. The plot was made when Flat Rock was still on manual control. Since automatic controls were put in, over-all operation is the same but is done in a much smoother manner.

To begin with, limiting discharge pressure on the line out of Flat Rock is 1,150 psi. And the desired maximum pump-case pressure is only slightly more than this. Thus, the station discharge-control valve cannot be used to limit discharge line pressure. If it were, maximum pump-case pressure would be exceeded. The discharge-control valve, in this case then, acts only to prevent starving of the pump suction when Toledo is on heavy oil and Flat Rock is still pumping gasoline.

To prevent both high line and high pump-case pressure, a suction-pressure controller is used. In reality, the suction-pressure control is in the discharge side of the station and the discharge-pressure control is in the suction side.

An explanation of pressure plot in Fig. 2 is as follows:

. . . Period 1. The entire line is filled with gasoline and Toledo is just starting a batch of No. 3 fuel oil. Both suction and discharge-control valves are open. As the fuel oil is started, suction and discharge pressures gradually fall until a minimum of about 20 psi. suc-


FUEL OIL
GASOLINE
PHASE CURRENT-AMPS
PRESSURE PSI AND THROUGHPUT IN BBLS PER HOUR
FLAT ROCK PUMP DISCHARGE PRESSURE BEFORE PINCH
FLAT ROCK ACTUAL LINE PRESSURE DOWNSTREAM OF PINCH
THIS AREA REPRESENTS DIFFERENCES BETWEEN ACTUAL PUMP PRESSURE AND LINE PRESSURE AT FLAT ROCK CAUSED BY PINCHING ON DISCHARGE WHEN TOLEDO IS PUMPING HEAVY OIL AND FLAT ROCK IS STILL ON LIGHT OIL. OTHERWISE FLAT ROCK WOULD STARVE ON SUCTION
THROUGHPUT
CURRENT ON HIGHEST PHASE OF NO. 1 MOTOR—AMPS.
PERIOD 1
PERIOD 2
PERIOD 3
PERIOD 4
STATION SUCTION PRESSURE
SUCTION VALVE WAS PINCHED BACK DURING THIS INTERVAL TO PREVENT EXCESS DISCHARGE LINE PRESSURE
JAN. 14
JAN. 15
JAN. 16
JAN. 17
TOLEDO ON NO. 3 FUEL OIL, 34.8° A.P.I., LINE FULL OF GASOLINE
NO. 3 FUEL OIL REACHES FLAT ROCK
TOLEDO ON NO. 1 FUEL OIL, 47° A.P.I.
NO. 3 FUEL OIL ARRIVES HAMTRAMCK STATION, LINE FULL OF FUEL OIL
TOLEDO ON GASOLINE, 66° A.P.I.
NO. 1 FUEL OIL ARRIVES FLAT ROCK
TOLEDO ON GASOLINE, 63° A.P.I.
66° A.P.I. GASOLINE ARRIVES FLAT ROCK
NO. 3 FUEL OIL ARRIVES HAMTRAMCK
63° A.P.I. GASOLINE ARRIVES FLAT ROCK
66° A.P.I. GASOLINE ARRIVES HAMTRAMCK, LINE FULL OF GASOLINE

PRESSURE PLOT across Flat Rock station during gasoline-fuel oil-gasoline pumping cycle. Fig. 2.

tion is reached. At that time the station operator throttles the discharge valve. This reduces throughput and line discharge pressure but keeps suction pressure up. The suction valve remains wide open. Throttling of the discharge continues through the rest of Period 1.

... Period 2. The fuel oil reaches Flat Rock. Pump-case pressure rises but line pressure and throughput are held down. Discharge valve is still governed by suction pressure. Note also the increase in motor phase current.

Near the end of Period 2, Toledo starts pumping a lighter fuel oil and both suction and discharge pressures at Flat Rock start up. Then the head end of the fuel-oil batch reaches Hamtramck station and line conditions steady for a short time.

... Period 3. As Toledo goes on gasoline, suction pressure at Flat Rock begins rising. At this point, without control over suction pressure, pump-case and station discharge pressure would start rising and would soon exceed set limits. But pinching down on the suction valve keeps a maximum of 1,150 psi. on the discharge. Discharge throttle valve is wide open at this time since a higher pump-case pressure cannot be tolerated.

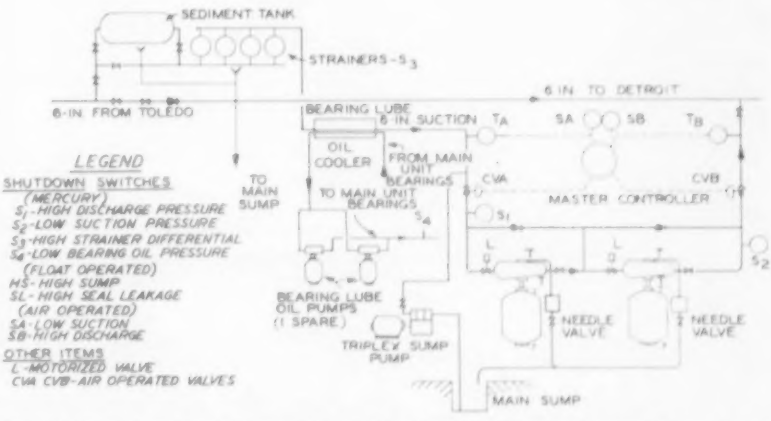
... Period 4. Finally, at the start of this period, suction pressure is at its highest point as gasoline reaches Flat Rock. Here, suction control is released and line discharge pressure begins falling again as throughput rises. Through the rest of the period, both suction and discharge valves are wide open and the line is on gasoline at its highest pumping rate.

In this manner pumping rate through the entire cycle has been kept at the highest possible value considering the products in the line. And at no time have either pump case or line pressure exceeded their maximum, or has suction fallen so low as to starve the pumps. But this took an operator who had to continually adjust suction and discharge valves as line conditions changed. The new automatic system accomplishes the same thing—but in a much smoother manner than can be done manually.

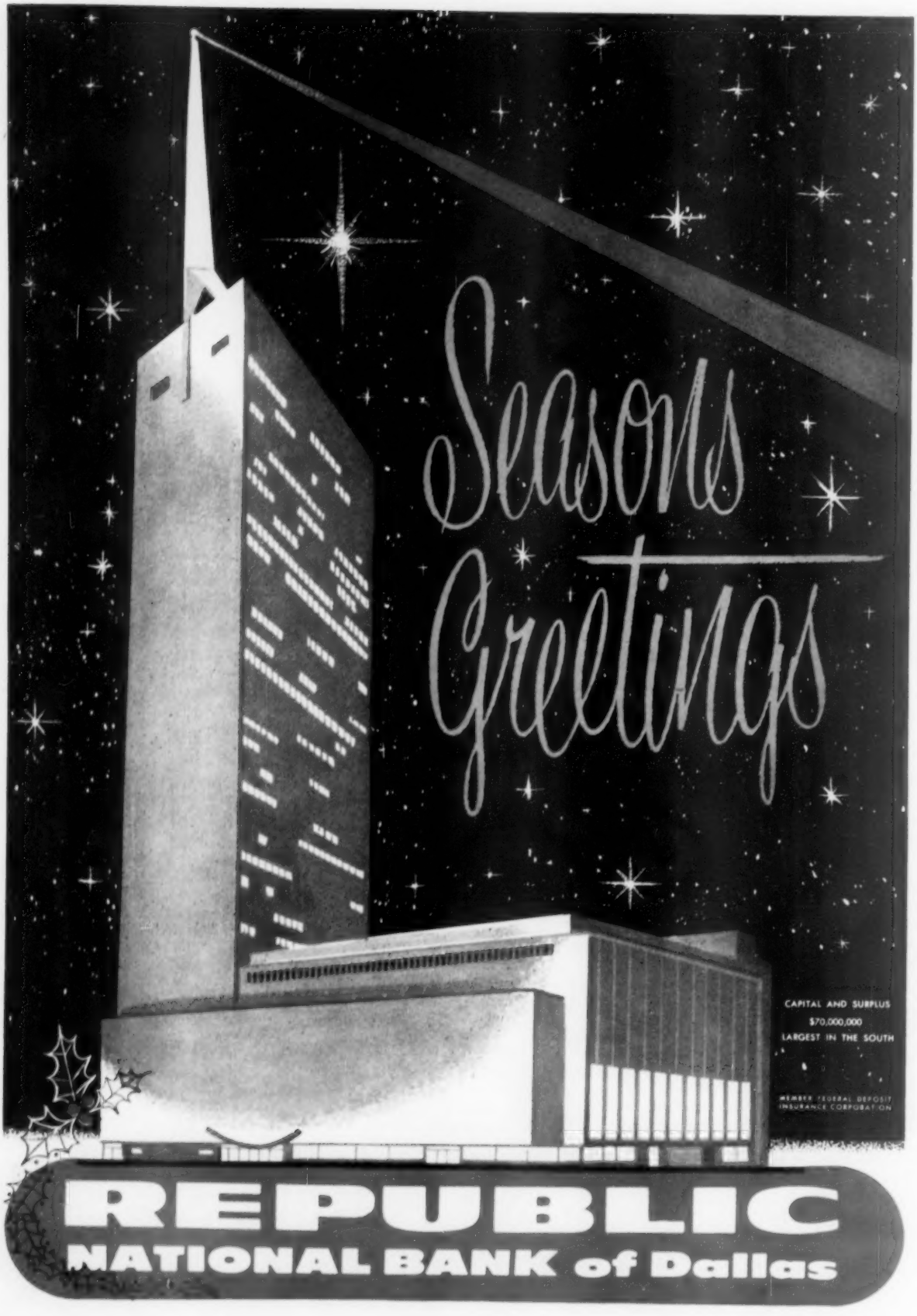
General Control System

Foremost feature of the Flat Rock control scheme is the small number of functions remoted. Toledo can start and stop the slave station. Also, the wire line used for supervisory signals is continually monitored from both sides. If the communication line is lost, Flat Rock automatically shuts down and Toledo gets a red light in notification. Beyond that, Flat Rock takes care of itself.

Designers of the system say that, at first, some consideration was given to telemetering of suction and discharge pressures, flow rate, motor currents, etc. But this information would have



SCHEMATIC of station showing suction and discharge controllers and control valves. Fig. 3.


Seasons Greetings
CAPITAL AND SURPLUS
$70,000,000
LARGEST IN THE SOUTH
MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION
REPUBLIC
NATIONAL BANK of Dallas

been more for curiosity than for utility unless extra control functions were vested in operators at Toledo. So, it was a case of either using no telemetered values and having the station operate automatically once it was on line, or going all the way and making a remotely controlled and operated station. The study, from an economic standpoint, was heavily in favor of the automatic installation with an absolute minimum of remoted functions.

Basically, the remote-control system uses audio tones transmitted over a leased wire between Toledo and Flat Rock. Frequency-sensitive relays operate in response to the tones and close contacts which initiate the starting or stopping sequence. At Toledo, the same type relays need only to close contacts for lights on a panel board to give evidence of the station running or being shutdown. A voice circuit is also available for use by maintenance crews and the lone station attendant.

Local controls . . . When manned, the station was started with an open discharge gate. The procedure was to start the bearing lube-oil pump, open the suction gate, and then start main unit.

This was carried over into the automatic installation since open-gate starting greatly simplifies the local control system. Thus, if no emergency-shutdown switches are closed, the start signal from Toledo causes starting of the bearing oil pump. Then the motorized suction gates (L in Fig. 3) open and the main units are started. Toledo can put on one or both units, depending on need. As the main units come up to speed, the pneumatic master controller takes over, regulating either suction or discharge control valves if need be.

During normal operation shutdown is initiated by a signal from Toledo. This causes tripping of the main unit starters, closing of the motorized suction valves, and stopping of the bearing oil pump.

Emergency protection . . . Mercury switches are the basic protective devices for the station. These are installed to shut down and lock out the station in case of:

1. High discharge pressure.
2. Low suction pressure (without lockout).
3. High bearing temperature on either main pumps or motors.
4. Low pressure on bearing lube oil.
5. High differential pressure across strainers.

In addition, float-actuated switches cause shutdown in case of high main sump level or excessive seal leakage on either pump unit. Normal seal leakage is bled to the main sump through needle valves. A small chamber upstream of the needle valve houses the float for the seal-leakage shutdown switch. Excess leakage won't flow through the needle valve fast enough so the float rises and the shutdown switch operates.

Besides the mercury switches for high-discharge and low-suction shutdown the station has backup protection from the pneumatic control system. Takeoffs from the pressure transmitting lines which feed the master controller go to air-pressure-operated shutdown switches.

In case of shutdown from any reason, an alarm bell sounds in the station office and in the residence. Also, an alarm signal is sent to Toledo where a panel light goes on. Toledo has no way of knowing why the station is down—just that it is down. A local annunciator panel has drops for all shutdown devices, however.

In this pipeline era of complicated telemetering, control, shutdown, and alarm systems this station is a model of simplicity. Also, its control system designers, faced with pumping equipment unable to take high case pressure, have come up with a novel means of solving the problem.

"SOMEBODY HAS TO PAY FOR IT—UNLESS IT SHOWS UP IN THE SHAKEOUT."

"Mr. Oil Man, are you getting true tests on your oil? Are you paying for oil you don't get? Are impurities taking part of your allowable? Are you paying the expense of handling impurities? Are your samples being shaken out at the proper speed, and are they at the proper temperature at the end of the shakeout?

"Test your good or bad oil the usual way, and then test it with the Melton Heating Centrifuge. The results of the Melton test will really surprise you."

One major oil company found enough difference in one tank of oil to pay for one Melton Heating Centrifuge. Another company estimates it found a difference of 19% in testing one "tank bottom." We know that we can save you money. Don't wait. The Melton Heating Centrifuge can pay for itself many times by giving you a true test on the oil you handle. Find out now by ordering one or more.

MELTON ELECTRIC HEATING CENTRIFUGES

Patent Pending
Model B-2 (6 Volt)

They heat oil samples maintaining heat before and during rotation, obtaining a true test. Now being used by twenty-six oil companies in the United States, Canada and South America.

Fully guaranteed against failure of any part of the entire unit for one year from date of purchase.

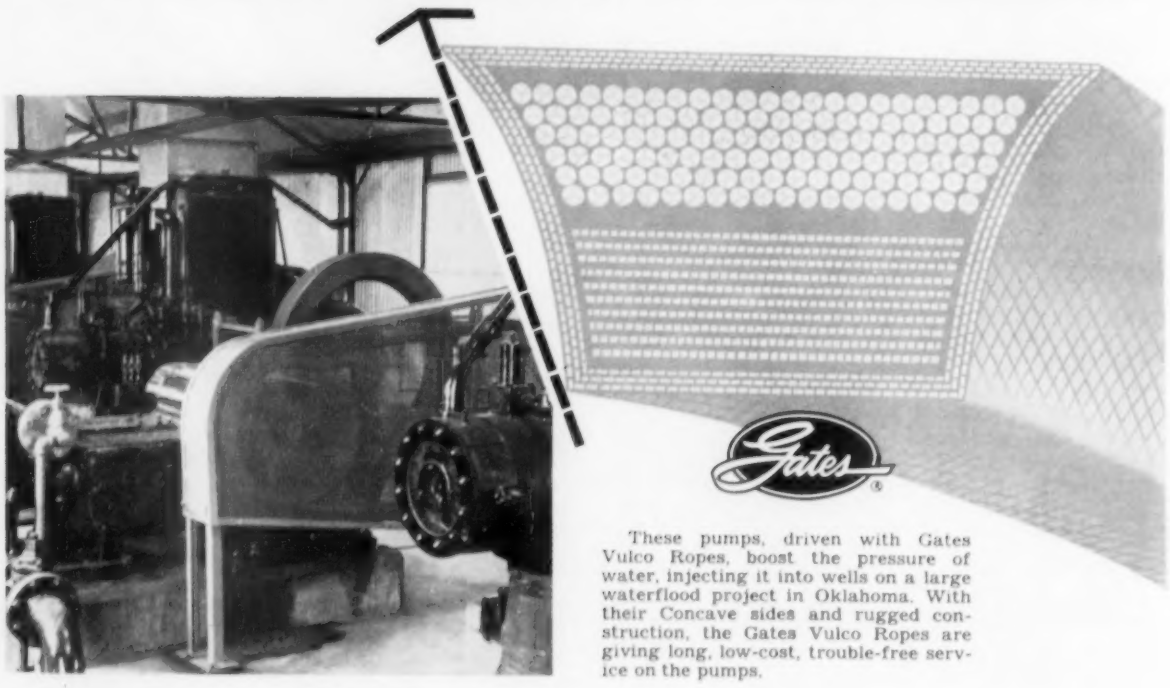
Model A-2-6 for 6 volt batteries
Model A-4-6 for 6 volt batteries
Model B-2-6 for 6 volt batteries
Model A-2-12 for 12 volt batteries
Model A-4-12 for 12 volt batteries
Model B-2-12 for 12 volt batteries
Model A-2-6-S for 6 volt batteries
Model A-4-6-S for 6 volt batteries
Model A-2-12-S for 12 volt batteries
Model A-4-12-S for 12 volt batteries
Model B-2-6-S for 6 volt batteries
Model B-2-12-6 for 12 volt batteries

Patent Pending
Model B-4 (115 Volt)

L-K PUMP VALVE COMPANY

632-40 No. Edgewood St. **P. O. Box 901, Houston 1, Texas** **Phone WAlnut 6-2623**

"Secret" of *lower* belt costs is concave sides



These pumps, driven with Gates Vulco Ropes, boost the pressure of water, injecting it into wells on a large waterflood project in Oklahoma. With their Concave sides and rugged construction, the Gates Vulco Ropes are giving long, low-cost, trouble-free service on the pumps.

Plants that keep track of costs on drives know this: they get longer wear at *lower cost per year of service* when they specify Gates Vulco Ropes—the V-Belts with *concave sides*.

Here's WHY concave sides keep belt costs down:

When the Gates belt is bent around the sheave, the *precisely engineered* concave sides (Fig. 1) fill out and become straight (Fig. 1-A). Thus the belt makes uniform contact with the sides of the pulley.

This full, uniform contact assures *even distribution of wear*. Naturally, *even wear* means *longer wear*. And longer wear cuts belt replacement costs...reduces down time...contributes to profits.

Prove to yourself the value of concave sides

Bend a straight-sided belt (Fig. 2) and feel the sides *bulge out* around the bend. You see immediately that the bulging sides prevent an even fit in the pulley groove (Fig. 2-A). Uneven contact causes faster wear...increases belt replacement costs.

Reduce costs and down time for belt replacements—specify Gates Vulco Rope Drives—the V-Belt with *concave sides* (U.S. Patent 1813698). The Gates Rubber Co., Denver, Colorado—*World's Largest Maker of V-Belts*.

Gates Engineering Offices and Distributor Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

TPA 46-C

GATES VULCO ROPE DRIVES

CALCULATION OF SURFACE TENSION—5

Finding Surface Tension of Amine and Glycol Solutions

by Ovid Baker
and
Will Swerdloff

FOR many compounds, surface-tension values may be found in References 1, 2, or 3*. Surface tensions of glycol and amine solutions are given in Fig. 4 through 7. In some cases it may be possible to use Fig. 3 (Installment 4), the relationship between surface tension and viscosity, if nothing better is available *(continued on next page).*

Authors are with the natural gas department, Magnolia Petroleum Co., Dallas.

*All references noted here were cited in the first installment of this series, which was published in the November 21 issue, p. 279.

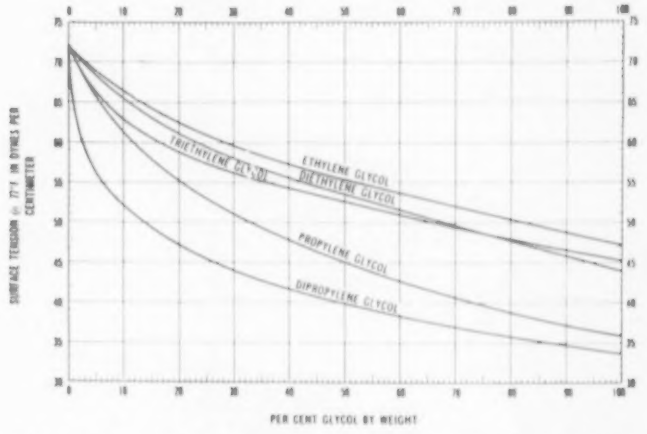


FIG. 4—Surface tensions of aqueous solutions of various glycols at 77° F.

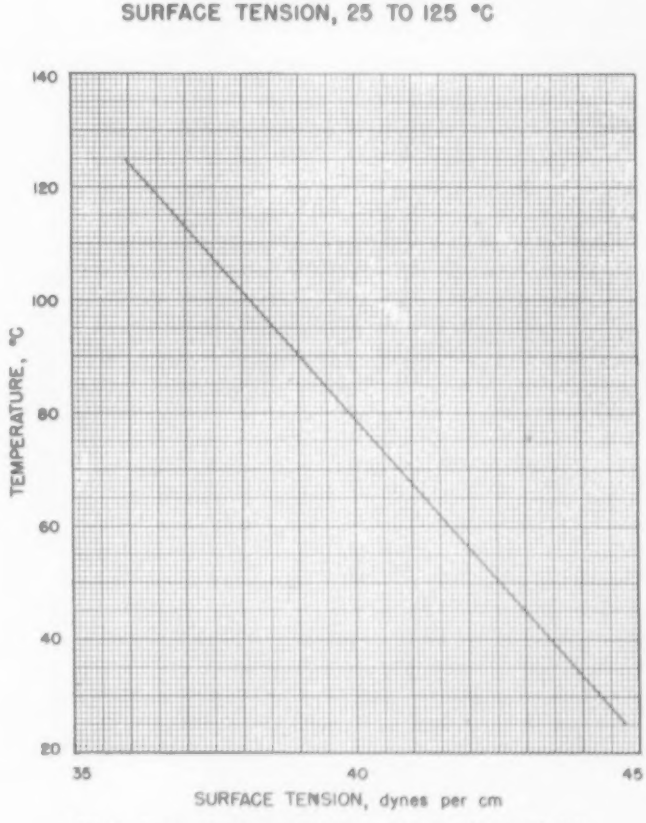


FIG. 5—Surface tensions of diethylene glycol at 25° to 125° C.

PREVIOUS INSTALLMENTS

. . . in this series of articles appeared in the following 1955 issues of The Oil and Gas Journal:

Installment	Issue	Page
1	November 21	279
2	November 28	114
3	December 5	141
4	December 12	113

REPRINTS

. . . this entire series of articles will be reprinted by the authors on its completion early next year. Anyone wishing to place an advance order for a copy of this reprint manual may do so by writing to:

Ovid Baker
Natural Gasoline Department
Magnolia Petroleum Co.
P. O. Box 900
Dallas, 21

Charts for . . .
CALCULATION OF SURFACE TENSION—5

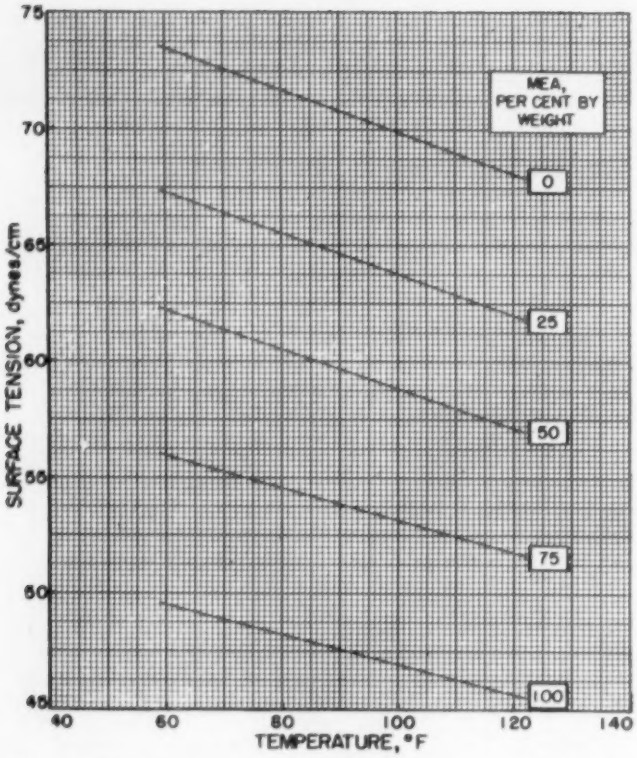


FIG. 6—Surface tensions of aqueous solutions of monoethanolamine at 60° to 125° F.

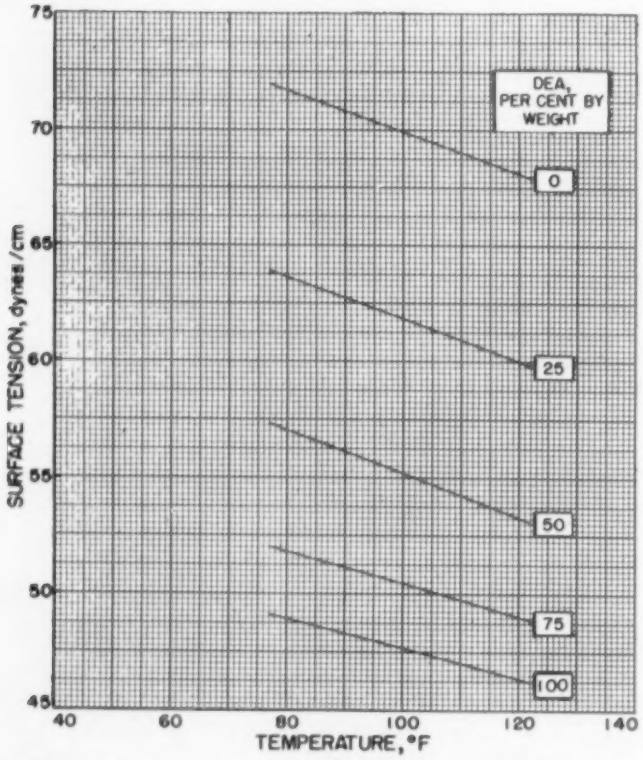


FIG. 7—Surface tensions of aqueous solutions of diethanolamine at 60° to 125° F.

by W. L. Nelson
Technical Editor

Yields of Coke by Various Processes

How may we estimate the yield of coke in coking operations and especially can we use your answer of July 7, 1952, for obtaining yields by the fluid coking process?—Wm. P. F.

No, the answer of July 7, 1952, page 103, entitled "Yields by Coking," applies to the delayed coking process which was the only process in wide use until 1955. Most plants still use the delayed coking process but the rapidly developing fluid and related processes may soon be widely used. The fluid process produces less coke and more gas oil than the delayed coking process. Thus, in using the answer of July 7, 1952, the amounts of gas oil (heading each column of Table 1) should be increased by about 25 per cent (actual yields range from 14 to 43 per cent).

An examination of the literature (see references) indicates the coke yields from residual feeds shown in Fig. 1. The less prominent dark points apply to various laboratory and pilot-plant yields by the contact coking and fluid coking processes whereas the large black points are yields published by Johnson & Wood for the fluid coking process. The X points apply to the Knowles & Curren oven-type processes.

Although Fig. 1 is useful, it is not a basically sound method of comparison because the proportions of gasoline and gas oil are not kept the same in all operations. Thus, if more recycling is practiced the coke yield will be larger and vice versa. The degree of recycling (or its equivalent) in fluid coking is fairly well fixed but great variations in recyling occur in the delayed process which sometimes has been operated for the production of scarcely any gas oil. The ultimate coke line of Fig. 1 applies to an operation in which no gas oil has been produced because it was recycled to extinction. Although the fluid coking process produces less coke, it produces (as now practiced) more gas oil than other processes and accordingly a larger capacity for cracking gas oil is required in connection with the fluid process, and it usually produces ultimately more residual fuel than the other processes. However, it is probably the most economical process even though more auxiliary cracking capacity is required.

Fig. 2 shows the approximate relationship between the percentage of Conradson carbon and the A.P.I. gravity of feed stocks. The low characterization-factor feed stocks (cracked and naphthenic oils) have lower Conradson carbon values and produce less coke.

References

1. Chadwick, John L., There's Profit in Coking of Synthetic Residua, The Oil and Gas Journal, March 22, 1954, p. 176.
2. Johnson and Wood, Fluid Coking Yields, The Oil and Gas Journal, November 29, 1954, p. 60.
3. Anon., The Blaw-Knox Decarbonizing Process, Pet. Refiner, July 1953, p. 106.
4. Anon., Fluid Coking Process, The Oil and Gas Journal, March 22, 1954, p. 130.
5. Anon., Delayed Coking and Visbreaking, The Oil and Gas Journal, March 22, 1954, p. 126.
6. Schutt and Offutt, Continuous Contact Coking, The Oil and Gas Journal, July 4, 1949, p. 90.
7. Garwin and Steinkuhler, Coking of Heavy Residual Oils, Ind. Eng. Chem., November 1951, p. 2,586.
8. Voorheis and Martin, Residual Oils Fluid Coked . . ., Pet. Engineer, Ref. Annual, 1954, p. C-3.
9. Jones, et al, Moving Bed Contact Coking Apparatus, Ind. Eng. Chem., January 1954, p. 12.

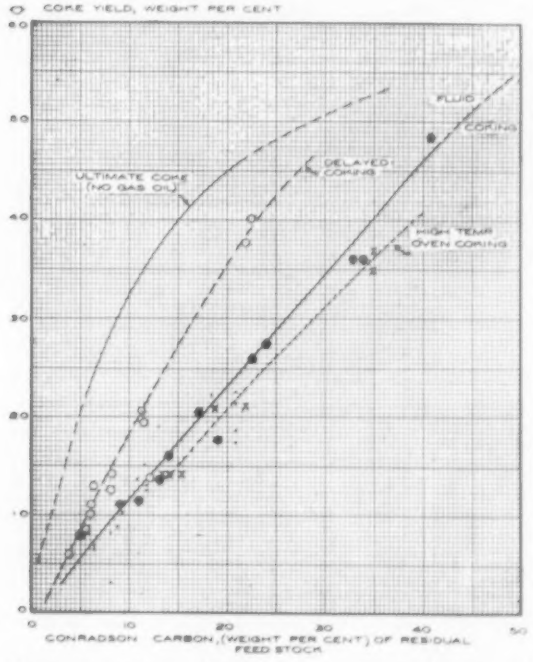

COKE YIELD, WEIGHT PER CENT
FLUID COKING
DELAYED COKING
ULTIMATE COKE (NO GAS OIL)
HIGH TEMP OVEN COKING
CONRADSON CARBON, (WEIGHT PER CENT) OF RESIDUAL FEED STOCK

Fig. 1—Approximate yields of coke by various coking operations.

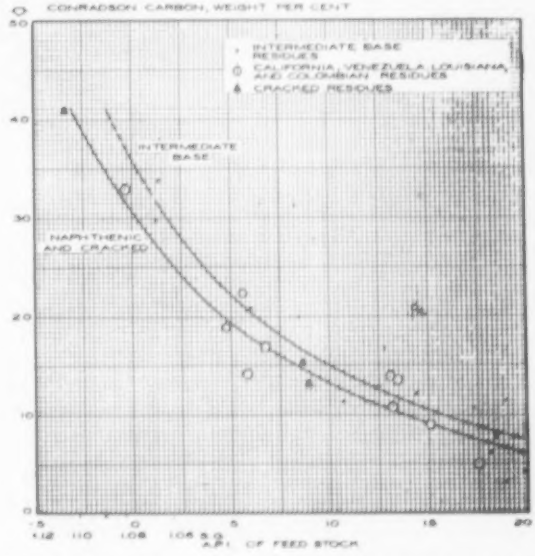


Fig. 2—Relationship between Conradson carbon and the gravity of feed stocks.

SOLA-FLEX®

joints absorb expansion at Shell Refinery

EVERY MAJOR OIL COMPANY uses Sola-Flex expansion joints to cope with difficult pressures and temperatures. These rugged, economical bellows are made to order for the toughest operations.

At Shell's Dominguez refinery, for example, Sola-Flex joints are used in several applications. The photo above shows a process air line to the main cracking unit structure. The 24 inch offset joint circled in the photo handles hot air at 250 F under normal operating pressure of 15 lb—although the joint is capable of withstanding 225 lb of pressure. A seven-inch axial movement and one-half inch offset movement are accommodated by the unit.

Solar builds both convoluted and U-span joints in a great variety of standard sizes and shapes, as well as special designs. Sola-Flex bellows fully conform with API-ASME piping codes. Write today for Sola-Flex catalogs, or for help with your installation problems. Solar Aircraft Company, Dept. B-95, San Diego 12, Calif.

SOLAR
AIRCRAFT COMPANY
SAN DIEGO DES MOINES

DESIGNERS DEVELOPERS AND MANUFACTURERS OF METAL ALLOY PRODUCTS • GAS TURBINES • BELLOWS • CONTROLS • HIGH TEMPERATURE COATINGS • AIRCRAFT COMPONENTS

UNDERGROUND STORAGE—9

What's Limiting Growth of Salt-Dome Storage?

by N. E. van Fossan

THE greatest expansion of all the types of storage now known will probably take place in salt domes. Forty per cent of all underground storage is now of this type.

Dome-salt advantages . . . The primary advantage of dome salt is its thickness of sections and relative freedom from stringer systems. It can be used with considerable benefit as an in-transit point to marketing centers where underground storage is impossible. Seemingly the only limitation on volume space developable per well is the amount of sections opened, the care in developing a chamber shape of proper structural strength, and the economic limits on surface handling equipment.

What cost? . . . It is generally recognized, however, that large-scale storage wells of this type isn't practical for the small operator. Budgeting figures should generally be set at around $400,000 per well.

It should be pointed out that: (1) drilling costs are completely unpredictable; (2) casing strings required for long-life wells are extremely expensive; (3) cement jobs are costly (resin costs in the neighborhood of $3 per gallon; plastics $5 per gallon) and are unknowns as far as volume and satisfactory end results are concerned; (4) high mortality rates exist on floating liners and tubing strings; (5) workovers are frequent and expensive, and (6) element of risk must also be given a value in any budget. All in all it will be seen that the budget figure is not unreasonable.

What volume? . . . It is also generally felt that developed volume per well should be in excess of 250,000 bbl. Some brine operators figure the costs of maintenance and depreciation on a well as being 70 per cent of the cost of producing the brine. The development of storage is very similar, and long-range experience should give sufficient attrition data to further support the argument on economics of minimum volumes per well. Several other reasons are advanced for this stand:

1. A large investment is involved in surface equipment to handle high volume at extreme pressures.

2. Operations must be carried on around the clock and thus overhead is high.

3. Smaller margins of profit, to be expected in future operations, must pay out a well, developed under present inflated conditions.

Author is with Texas Natural Gasoline Corp., Tulsa. Paper presented at N.G.A.A. Dallas meeting, 1955.

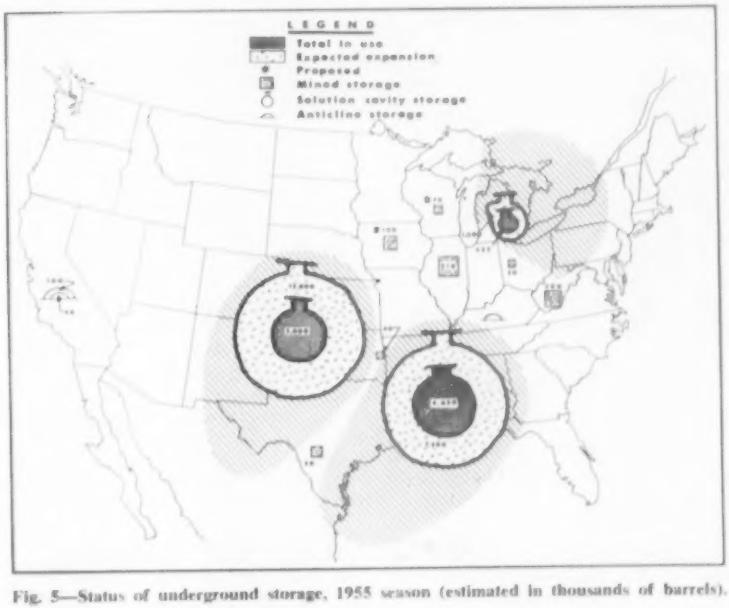


Fig. 5—Status of underground storage, 1955 season (estimated in thousands of barrels).

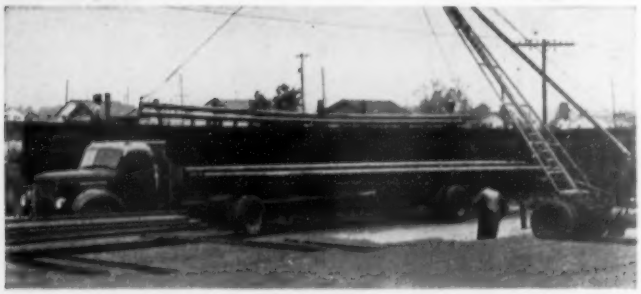
ABOUT THE AUTHOR

Neal E. van Fossan, manager, Storage and Terminal Division, Texas Natural Gasoline Corp., has been associated with the field of underground storage since its inception in 1949. He is a 1941 graduate of the University of Illinois, with a B.S. in mechanical engineering.

Prior to joining the Texas Natural Gasoline Corp., he was employed by the Hewgley Drilling Co. as project engineer on the Bassinger percussion drill, and by the Slick-Urschel Oil Co. as a field engineer. As field engineer for the Slick-Urschel Oil Co., he was closely associated with the early experiments in development of the first underground storage well in the United States, which was drilled by the Texas Natural Gasoline Corp., in Upton County, West Texas.

Van Fossan was transferred to the Tulsa office of the Texas Natural Gasoline Corp. early in 1953, and shortly thereafter was put in charge of that company's rapidly expanding storage and terminal system.

No doubt about it–
BETH-CO-WELD'S the buy!



Whenever you need line pipe for jobs around the lease or rig, you can count on good, dependable service from Beth-Co-Weld steel pipe.

Beth-Co-Weld is quality pipe through and through. In fact, Beth-Co-Weld is backed by years of customer approval, being one of the first fully accepted types of continuous-weld line pipe in the oil fields. It's ideal pipe for gathering systems, gas-distribution systems, service lines on the drilling rig, and maintenance piping.

Beth-Co-Weld can be furnished in accordance with the requirements of ASTM-A-120 and A-53, API 5L and other equivalent specifications. It is sold on a competitive basis. It can be obtained coated, or uncoated for field wrapping. In addition, it can be wrapped at the mill. You can get prompt delivery, too, regardless of quantity.

Your nearest Bethlehem Supply store has a large stock of Beth-Co-Weld on hand, ready for loading at a moment's notice. They'll welcome your inquiry.

Beth-Co-Weld comes in sizes from ½ in. nominal to 4½ in. OD in both black and galvanized in standard weight, and in sizes ½ in. through 3 in. nominal in extra-strong weights. Supplied in weights lighter than standard in sizes 3½ in. OD and 4½ in. OD. Available in single mill lengths, also in sizes 1½ in. through 4½ in. OD in double mill lengths up to 50 ft, and can be furnished threaded and coupled, plain end beveled for welding, or plain end square cut grooved for ring joint coupling.

BETHLEHEM SUPPLY COMPANY

General Offices:
21 E. Second St., Tulsa, Okla.
West Coast Headquarters:
Los Angeles, Calif.
Export Distributor:
Bethlehem Steel Export Corporation
25 Broadway, New York, N. Y.

BETHLEHEM STEEL

JOB IMPROVEMENT FOR THE PROCESS FOREMAN—35

Handling Fluid Viscosities in Rotary Pumps

BEFORE any new installation is made, the cost of larger-size piping which will result in lower pump pressures, should be carefully balanced against the cost of a less expensive pump, smaller motor and a saving in horsepower over the expected life of the system.

The larger piping may cost a little more in the beginning, but the ultimate savings in power will often many times offset the original cost.

These facts are particularly true of the handling of extremely viscous fluids. Although most engineers dealing with fluids of this type are conscious of what can be done, it is surprising the number of installations encountered where considerable savings could have been made if a little more study had been made initially.

Q. What's the efficiency of a rotary pump?

A. Efficiency is dependant on practically all of the factors already discussed such as size of pump, rotative speed, viscosity, and pressure differential. It can be calculated for any specified set of conditions but will vary with any change in these conditions.

Sometimes an attempt is made to calculate the efficiency on the basis of guaranteed capacity and brake horsepower. This is satisfactory provided that both were figured on the same viscosity. But normally, where rotary pumps are used, a viscosity range has been specified or assumed. The capacity has been guaranteed on the minimum viscosity and the brake horsepower has been guaranteed on the maximum. If these figures are used in an attempt to calculate efficiency, a false value will result.

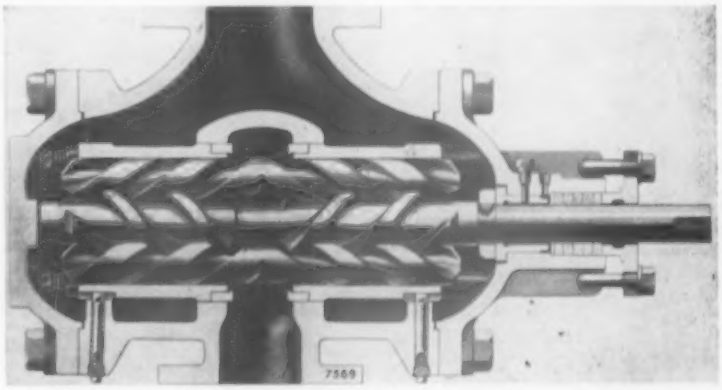
Good efficiencies can be obtained if a pump is properly selected to meet one set of conditions only. For example, medium-size pumps of about 50 to 100 g.p.m. capacity operating against 100-psi. discharge pressure normally have efficiencies of about 70 to 80 per cent. Higher-pressure pumps of about the same capacity, selected for optimum conditions, will give as high as 85 to 87 per cent.

Q. In selecting a pump, should the kind of fluid to be handled be taken into account?

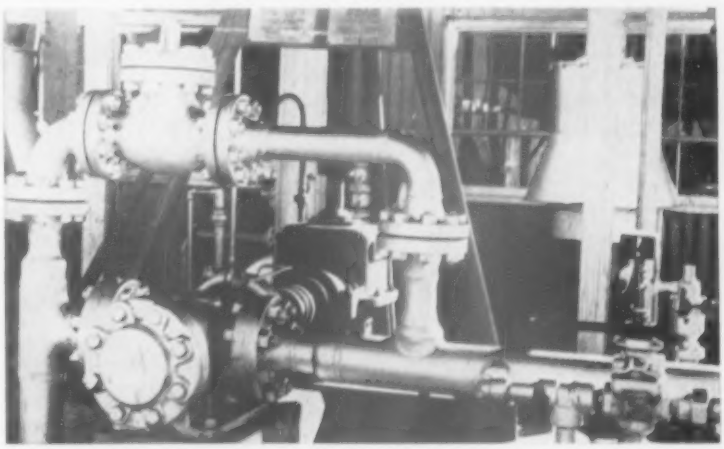
A. Definitely yes! Due to that fact that rotary pumps depend upon close clearances for proper pumping action, the handling of abrasive fluids will usually cause rapid wear.

During the last 20 years, great progress has been made in the design and application of rotary pumps. Pumps of this type are available for the handling of fluids ranging from aviation gasoline and water to such semiplastics as cellulose products, chilled shortening and greases. Where required, extremely high vacuum, pressures, and speeds are possible and practical.

If complete information is given (suction conditions, viscosity, air or gas entrainment, discharge pressure, etc.) so that a proper pump selection can be made, and if proper attention is paid to installation features (particularly on the suction side) there is no reason why a good installation cannot be made.



THIS simple basic rotary pump (DeLaval-Imo) has only three moving parts.



VERSATILITY of rotary pumps can be seen in this use in a hydraulic drive system for the cooling tower at a pipeline compressor station.

From material prepared by W. J. Mongon, De Laval Steam Turbine Co., Trenton 2, N. J.

DOW

THE BEST PROTECTION COSTS LESS!

Use GALVOMAG—4 of these high-potential anodes do the work of 5 conventional anodes—and the savings are yours

GALVOMAG® anodes can save you money in cathodic protection installations because it takes fewer of these anodes to do the job *right*. If higher soil resistivity makes the going rough, then GALVOMAG offers 25% more current output to solve your problem there, too.

These new GALVOMAG anodes are saving money all along the line on installations—cutting time and labor.

Call your Dow anode distributor today for complete facts on these new high-potential anodes. THE DOW CHEMICAL COMPANY, Midland, Michigan.

*Trademark of The Dow Chemical Company

DISTRIBUTORS: CATHODIC PROTECTION SERVICE, Houston, Texas • CORROSION SERVICES, INC., Tulsa, Okla. • ELECTRO-RUSTPROOFING CORP. (Service Division), Belleville, N. J. ROYSTON LABORATORIES, INC., Blawnox, Penna. • STUART STEEL PROTECTION CORP., Kenilworth, New Jersey • THE VANODE CO., Pasadena, California.

you can depend on DOW MAGNESIUM ANODES DOW

For pipeline electrical designers:

How to protect valve-operator motors

by George H. Beck

MOTOR-OPERATED valves have played a big part in advancing automatic control of pipeline stations, compressor stations, refineries, etc. But far too many of these motor operators are burned out even though they are protected by both torque and limit switches. This may be caused by a lack of understanding of electric-motor overload relays.

Most motor operators, by the nature of their function, operate a few times a day at most. Many of these operators run for 30 seconds or less to open or close a valve. This means that most operators are intermittent-duty rated and should be treated as such when overload-relay thermal elements are selected.

Larger intermittent-duty motors are usually protected so that they will stop with normal load at about the end of their duty cycle. That is, a 10-hp., 15-minute-duty motor should have overload protection sized so that the motor would stop at the end of 15 minutes if it has been operating at full load.

With a little refinement, this same principle can be applied to valve-operator motors. But in this case, the motor's locked-rotor current should also be taken into account to prevent the motor from burning up in case the valve will not move. Most valve-operator motors will stand locked rotor current for about 20 seconds without severe damage. This, then, should be about the maximum time that an operator should be allowed to attempt to open or close a "stuck" valve.

Author is engineer with Continental Pipe Line Co.

Torque curves give clue . . . A statement often heard on the subject is that it would be better to burn up the operator than not to open the valve. The author believes that this statement is true in many cases. However, allowing the valve operator motor to burn out would not open the stuck valve. An analysis of the torque characteristics of electric motors and design characteristics of most modern motor operators shows why the valve will remain stuck if not started in its travel within the first few seconds.

Fig. 1 shows that motor torque raises almost instantly to the maximum, which is from 5 to 10 times normal running torque. If the rotor is held or locked, the torque soon falls off. This is because the resistance of the motor windings increases with increasing temperature—the natural result of high current in the motor windings. The motor's maximum torque can only be obtained before the motor windings have begun to heat.

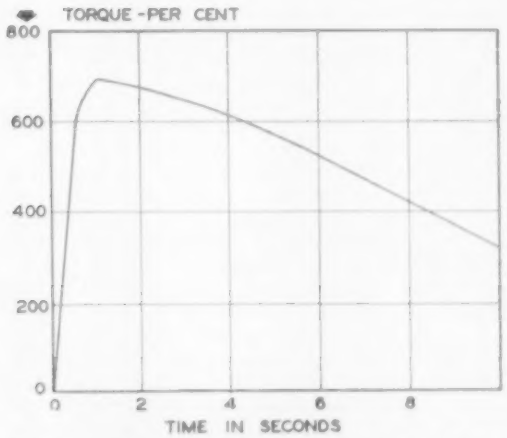


Fig. 1—Maximum torque (locked rotor) is attained at first part of energized period, then decreases rapidly.

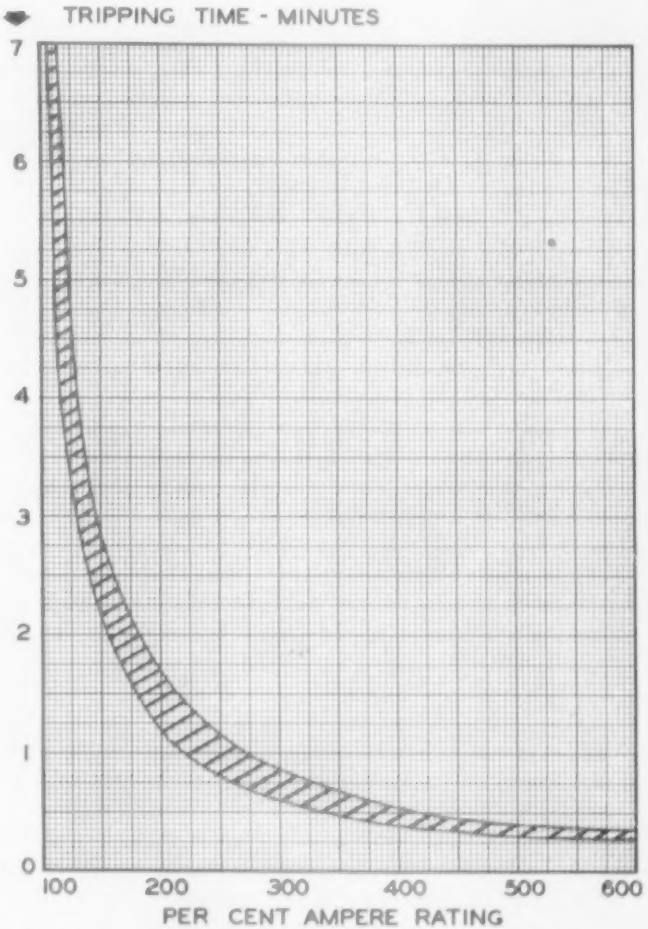


Fig. 2—Time-current characteristic of thermal element shows tripping current varies over wide range. Width of curve allows for manufacturing tolerances.

PIPELINE PATROL

Most modern motor operators have a built-in "hammerblow" effect that aids the motor to start the valve in its travel. This is done by allowing the motor to get almost up to speed before it takes the load of the valve. Thus the motor is producing its maximum torque at starting and its maximum momentum to start the valve.

Once started on its travel, the valve operator should have little trouble in continuing the valve's travel to the stop if the operator has been properly sized. This article does not deal with sizing of valve operators to valves. This logically should be done by manufacturers.

Method insures protection . . . The method described below was used successfully by the author to protect about 120 motor operators. The valves operated included gates and plugs in both high and low-pressure pipeline service.

The time-current characteristic curves on the overload relay to be used to protect the operator were obtained from the control manufacturers who were quite willing to supply this information. The full load and locked rotor currents of the operator were obtained from their manufacturer.

A typical time-current characteristic curve is shown in Fig. 2. Note that the abscissa is in "per cent of full-thermal-element capacity" and that the ordinate is in minutes. The crosshatched area is to cover manufacturing tolerances, since a very slight change in composition or size of the thermal element changes its ratings. These curves also represent average tripping valves, so that the entire crosshatched area should be considered for proper protection.

The first step is to select a thermal element that is approximately the same rating as the motor operator's full load current. By way of illustration, let us select a thermal element of 4.73-amp. capacity to check application to a motor operator having a full load current of 5.0 amp. and a locked rotor current of 25.5 amp.

The locked rotor current of the motor divided by the rating of the thermal element, (not the full load of the motor), times 100 is the per cent rating of the element. In our example, this value is 540 per cent.

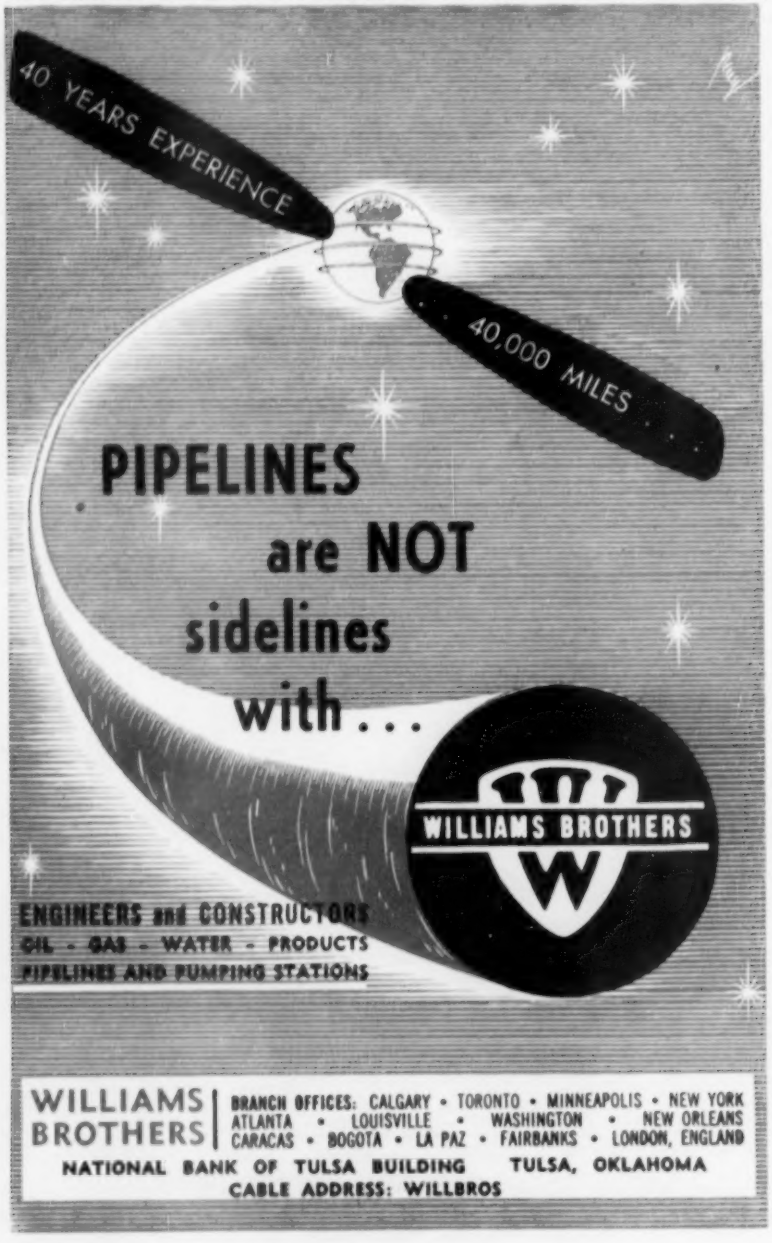
Referring to Fig. 2, the 540 per cent line intersects the lower extremity of the crosshatched area at a time of 15 seconds. It intersects the upper edge on the crosshatched area at 20 seconds. This means that the overload relay with this thermal element would open the motor circuit with the valve stuck somewhere between 15 and 20 seconds, which would be correct for valves with this operator.

At the same time, a 5.0-amp. load is only 105 per cent of the 4.73 thermal element rating. This would result in a tripping time in excess of 6 minutes, which would be adequate time for any normal valve operation.

If the earliest opening time was deemed to be too soon or the latest opening time too late, the size of the thermal element would be increased or decreased, respectively, to achieve the desired result.

Don't forget ambient . . . Care must be used to take enclosure ambient temperature into account when selecting thermal elements. If it isn't an increase in ambient temperature will cause overload elements to trip earlier than they otherwise might.

Motor design trends seem to be to put more torque into smaller size. This means that motor overload protection will become increasingly important. The extensive use of motor-operated valves in automatic or semiautomatic installations will continue. This means that your company can save a great deal by properly protecting these vital tools.


40 YEARS EXPERIENCE
40,000 MILES
PIPELINES
are NOT
sidelines
with . . .
WILLIAMS BROTHERS
ENGINEERS and CONSTRUCTORS
OIL - GAS - WATER - PRODUCTS
PIPELINES AND PUMPING STATIONS
WILLIAMS BROTHERS
BRANCH OFFICES: CALGARY • TORONTO • MINNEAPOLIS • NEW YORK
ATLANTA • LOUISVILLE • WASHINGTON • NEW ORLEANS
CARACAS • BOGOTA • LA PAZ • FAIRBANKS • LONDON, ENGLAND
NATIONAL BANK OF TULSA BUILDING TULSA, OKLAHOMA
CABLE ADDRESS: WILLBROS

PROTECT OIL AND GAS PIPE LINES with *NICOLET ASBESTOS PIPE LINE FELT*

FIGHT PIPE LINE CORROSION WITH ANY OF THESE NICOLET FELTS

- ★ Nicolet 15 lb. *Asbestos* Felt, Tar or Asphalt Saturated
- ★ Nicolet 15 lb. *Asbestos Felt*, parallel glass yarn reinforced, Tar or Asphalt Saturated
- ★ Nicolet 15 lb. *Asbestos* Felt, Perforated on Uniform Centers, Tar or Asphalt Saturated
- ★ Nicolet "Tufbestos" 8 lb. *Asbestos* Felt reinforced with parallel glass yarns, Tar or Asphalt Saturated
- ★ Nicolet "Reflecto" 8 lb. or 10 lb. White Neoprene Treated *Asbestos* Felt, glass yarn reinforced

Asbestos is *inorganic*. We believe this *inorganic* material, which comprises the major contents of the base felt, provides a longer-lasting shield protection for all pipe line enamel coatings.

Write for your copy of the new Nicolet Catalog

ALL INQUIRIES WELCOME

Photo showing Nicolet Felt Protecting Pipe Line

The Felt With a Future

MANUFACTURED BY
NICOLET INDUSTRIES, INC.

70 PINE STREET
NEW YORK 5, N. Y.

KEEP PURE DRINKING WATER ALWAYS HANDY

insist on the highest quality

Gotkool
water cans and coolers

Specify "GOTKOOL" the next time you order water cans or coolers. "GOTKOOL'S" exclusive construction keeps water cooler . . . fresher . . . purer. Extra wide, snug-fitting, splash-proof top keeps out impurities. Non-leaking, push-button faucets, either extended or recessed flush-mounted. *Buy "GOTKOOL" at your supply store today.*

GOTKOOL Water Cooler – made in 1½-, 2-, 3-, 5-, 10-, 15-, and 20-gallon sizes with either extended or recessed, flush-mounted faucet. *Note:* 15- and 20-gallon sizes available with extended faucet only.

GOTKOOL Water Can – made in 1½-, 2-, 3-, 5-, 10-, 15-, and 20-gallon sizes without faucet.

Insist on the genuine – look for the Blue and Black Label with the name "GOTKOOL" in Red.

H. P. GOTT MFG. CO.
WINFIELD, KANSAS

Oil Loans

THE 1ST NATIONAL BANK OF SHREVEPORT

LOUISIANA'S OLDEST BANK

PIPELINE PATROL

Two-cycle engines can run at varied speeds

by R. L. Boyer

IN some quarters there is an erroneous notion that if an internal combustion engine must be run at variable speeds it should be a four-cycle unit. Actually, there is little if any difference between the abilities of two-cycle and four-cycle engines to operate at varying speeds.

A survey of the field provides three reasons why some two-cycle engines fail to perform well in variable speed operation. These reasons are: (1) ignition; (2) gas pressure; and (3) lubricating-oil pressure. No fundamental reason could be found since the two-cycle engine will scavenge well at almost any speed.

Ignition . . . For simplicity, many engines have been equipped with magneto ignition rather than battery ignition. Unfortunately, many magnetos will not perform well at low speeds. Present-day magnetos do perform well to a point considerably below half speed, and many of them to one-third speed or lower.

Author is vice president and chief engineer, The Cooper-Bessemer Corp., Mount Vernon, Ohio.

Gas pressure . . . Perhaps the only characteristic chargeable to the two-cycle engine is that it is somewhat sensitive to fuel-gas pressure. While the engine can be operated at half speed with full gas pressure, it is easily stalled if it is suddenly returned to full speed. Control equipment which reestablishes the speed slowly will eliminate this difficulty. The installation of variable gas pressure controlled by speed completely eliminates the difficulty and makes for a better performing engine at all speeds.

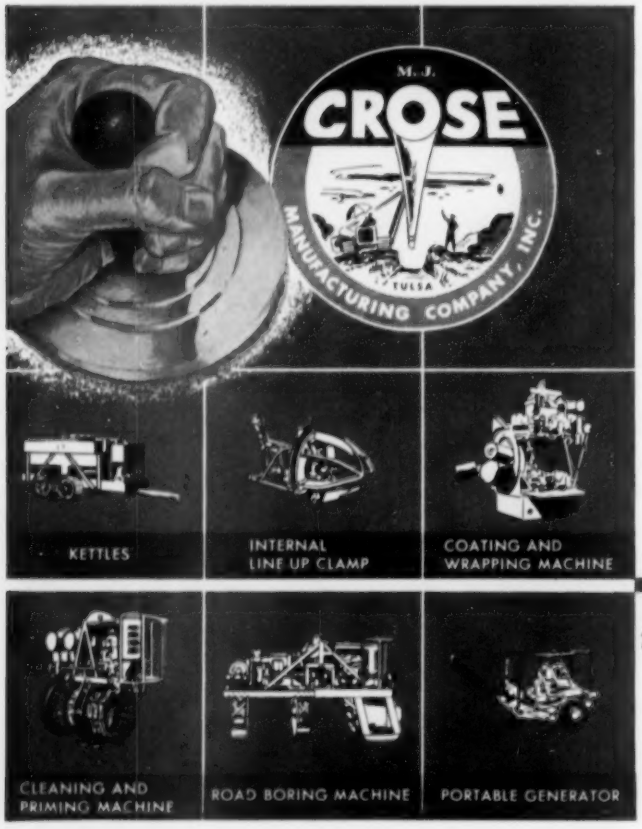
Lubricating-oil pressure . . . The field survey showed that in at least a few cases operators had indicated that the three-cycle engine would not perform well at low speed pressure its lubricating-oil pressure reduced too much. Obviously, a lubricating-oil pump does not know whether it is on a two or a four-cycle engine.

Actually, the probable reason that the lube-oil pump was charged as being of insufficient capacity was that some pressure alarms may have been set too high and may have even shut down the engine when the speed was reduced.

There is a mistaken impression that the full lubricating-oil pressure must be maintained at all speeds. Actually, lubricating-oil pressure is required not so much for lubrication as for the circulation of a proper amount of lubricating oil for cooling purposes.

If the engine is reduced to half speed, the lubricating-oil pump delivers only half its full capacity. This is ample for all purposes because the engine needs only half as much lubricating oil when putting out only half as much power. To put through half as much lubricating oil requires only one-fourth as much lubricating-oil pressure. It is perfectly logical, therefore, that the pressure should fall off as speed is reduced.

We have made an extensive investigation of this problem and find that our four-cycle engines are controlled by exactly the same requirements as the two-cycle, and that they are equally responsible in variable-speed operation.



...the sign of rugged
PIPELINE EQUIPMENT

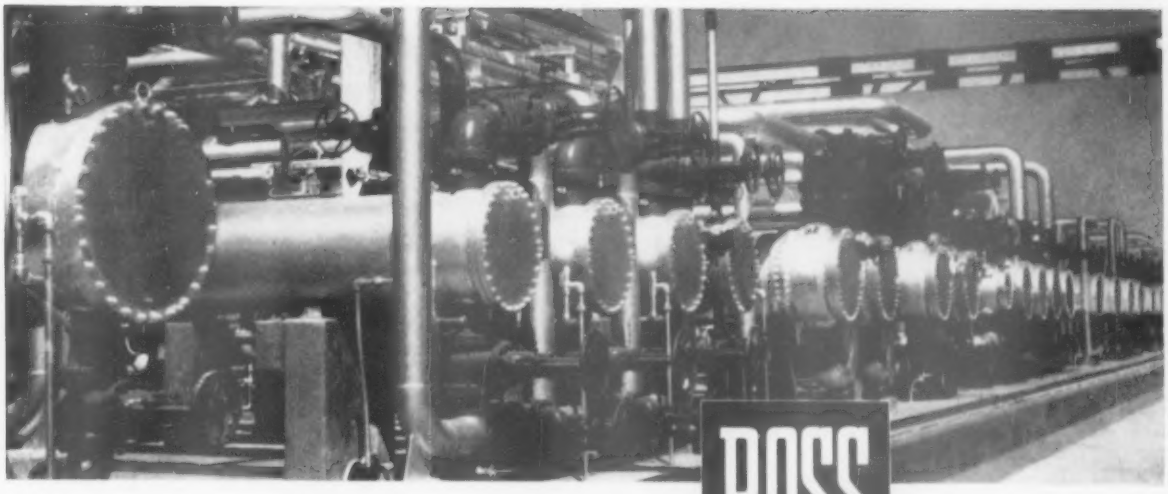
When you see a Crose emblem on pipeline equipment you can be sure that it is built to stand up over miles of rough pipelining — It's rugged and engineered to give trouble-free service, that's why it pays to specify Crose — the finest in pipeline equipment!

CROSE EQUIPMENT for every pipeline operation: Yard pipe reconditioning machines, pipeline cradles, portable buffing machines, slag buster, pipe defroster, pipe preheater, cutting and beveling machines, coupon cutter

m. j. Crose
MANUFACTURING CO., INC.

2715 DAWSON ROAD • PH. MA 6-2172 • TULSA, OKLAHOMA
14693 EAST COLFAX AVENUE, AURORA, COLORADO • 500 FIFTH AVENUE, NEW YORK CITY
DISTRIBUTORS
CROSE CURRAN LTD. EDMONTON • CROSE PIPELINE EQUIPMENT CO., INC., NEWARK, N. J. • PIPELINE SUPPLY CO., HOUSTON

HEAT EXCHANGERS BY THE MILE



If you watch production at the Ross plant, you'll see the world's most modern heat exchanger assembly techniques at work . . . moving exchangers and condensers down the lines by the thousands . . . to serve industries here and abroad.

Complex, highly specialized refinery exchangers and giant power plant surface condensers . . . one of a kind or dozens alike. Completely standardized engine oil and water coolers, compressor inter and after coolers, hydraulic fluid coolers . . . hundreds upon hundreds of identical units. End-to-end, they would stretch out for miles.

Standardized or specialized, mammoth or pocket size, single or by the thousand . . . whatever industries require in heat exchangers, Ross makes it. In its long, diversified experience, this Company has engineered and built virtually everything that is sound and practical in heat transfer equipment.

Where can you find a more qualified source for serving *your* requirements? Who could possibly be in a better position to work with you . . . to recommend and *deliver* exactly what you need? Your request will bring a Ross engineer promptly to your desk. Write.

ROSS HEAT EXCHANGER DIVISION
OF
American-Standard
1417 WEST AVENUE • BUFFALO 13, N. Y.
In Canada: Kewanee-Ross of Canada Limited, Toronto 5, Ont.

MEMBER T.E.M.A.

PROTECT NEW JOINTS

Trying to break out galled and seized new tool joints often results in bent drill pipe. You can prevent this by making up new joints with 'Bestolife Lead Seal. 'Bestolife provides the necessary film strength and metal cushioning to prevent galling and seizing during the critical break-in period—and permits easy break out. This means long, economical life for tool joints. 'Bestolife is stocked by leading supply houses the world over. In 1¼, 5, 20 and 50 lb. cans. Unconditionally guaranteed.

I. H. GRANCELL
1601 EAST NADEAU STREET
LOS ANGELES 1, CALIFORNIA

MUDWONDER®

NEW
Rockwell-Built
MUD VALVE

GIVES
LONGER
SERVICE

Edward Valves, Inc.
Subsidiary of **ROCKWELL MFG. CO.**
1212 W. 145th STREET
EAST CHICAGO, INDIANA

Among the Drilling Contractors

Trend Drilling Co. is scheduled for a 4,800-ft. wildcat test to be drilled for Wilson Broach & Co., of Beaumont, Tex., in Live Oak County, South Texas. Location is 4 miles east of Dinero, in the M. B. Kivlin Survey 11. Permit is for 1 Sale. Location is 3 miles northeast of Mount Lucas field.

Continental Drilling Co. has the contract for a deep test Union Oil Co. of California is starting at a wildcat location 4 miles east of Orange Grove field, in Terrebonne Parish, Coastal Louisiana. Hole is projected to 11,000 ft. The operation is listed as 1-B Southdown with location in 64-17s-17e.

Bush Drilling Co., Eunice, La., has a new wildcat operation in southern Evangeline Parish, South Louisiana. Location is 5 miles northwest of Savoy field (St. Landry Parish) at 1 Guillory, in 34-5s-1e. Contract is for 9,000 ft. Southern Minerals Corp., of Corpus Christi, Tex., is the operator.

Owen Drilling Co. is contractor on a new 10,150-ft. wildcat operation 2 miles southwest of Rosedale field, in Iberia Parish, South Louisiana. It is being drilled for Temple Hargrove, operating from Slidell, La. Location is at 1 Wilbert, in 58-7s-9e.

Penrod Drilling Co., Shreveport, La., is to drill D. H. Byrd's projected 8,600-ft. wildcat at 1 Lutcher-Moore, in 26-5s-12w, 2½ miles southwest of Bivens field, in Beauregard Parish, southwestern Louisiana. It also has a new operation scheduled in the Lapeyrouse area, of Terrebonne Parish, for Placid Oil Co., affiliated operating company, and associates. The latter is permitted to 15,000 ft. It is on a Louisiana Land & Exploration Co. lease 2 miles south of production in 23-20s-18e.

Anschutz Dirilling Co., Wichita, Kans., is drilling for Argo Oil Co. and Cosden Petroleum Co. at a wildcat location 8 miles northeast of South Baggs field, in Carbon County, Wyoming. It is a 6,100-ft. Mesaverde test at 1 Government-Fleetwood, in 19-13n-90w.

Calvert Drilling Co., Olney, Ill., has a new contract job going for Midwest Oil Co. in Laramie County, southeastern Wyoming, in the Denver-Julesburg basin. Location is at 1 Sundin, in 8-15n-60w, 5 miles northwest of Pine Bluff.

W. D. Kennard Drilling Co. is contractor on a new 6,000-ft. test D. D. Feldman is drilling in the West Garcia area, 12 miles northwest of Sullivan City, in Starr County, southwest Texas. Location at B. C. de Vela, in Porcions 91 and 92, Share 2-A, is about 1,800 ft. southeast of the operator's dry-gas discovery well, completed last August in a 3,200-ft. sand.

Maxwell Herring Drilling Corp., Tyler, Tex., is a Woodbine test for Pure Oil Co. at a wildcat location 3½ miles northwest of Van field, in Van

L. C. Smith (right), tool pusher for Western Drilling Co., Lubbock, Tex., and one of his crews on a Western rig operating on contract for Kay Kimble in Callisburg field, northeast of Gainesville, in Cooke County, North Texas. Crewmen, left to right, are: Bob Oats, driller; M. R. Oats, derrickman; A. C. Washington, engineman; and G. A. Glocer, floorman.

Zandt County, East Texas. Location is for 1 Leonard, in the Phillips Mason Survey.

Cardinal Drilling Co. has contracted for a wildcat test to be drilled 7 miles southeast of Bottineau, in Bottineau County, on the northeastern rim of the Williston basin, in northern North Dakota. Russell D. Garner is operator. Location is at 1 Kippen, in 33-161-75w.

Circle Drilling Co., Lake Charles, La., is under contract for an 11,500-ft. test for Christie, Mitchell & Mitchell, of Houston. It is a wildcat operation 3 miles east of Burton field, in St. James Parish, southeastern Louisiana. Permit lists it as 1 Graug & Ard, with spot in 10-12s-16e.

Trant Drilling Co., Tyler, Tex., has a new Travis Peak operation in Angelina County, East Texas. It is for the account of Sam Trant, owner of the contracting company, and others. Location is 2½ miles north of Pollock, in the Joseph Durst Survey. Objective is expected about 10,700 ft.

J. B. Swabbing Co. has a rig running on a wildcat location 1 mile northwest of Recklaw, in Cherokee County, East Texas. It is a contract job for Bill R. Tipton, of Marshall, Tex. Location is at 1 Thornson heirs, in the P. O. Lumpkin Survey. Drilling is set up for a 4,600-ft. Woodbine test.

Sunnyland Contracting Co., Rayne, La., is scheduled for a 9,100-ft. Lower Cretaceous test to be drilled for Midwest Oil Corp. and Charles B. Gholson in the Purvis townsite, Lamar County, southern Mississippi. Spot location is listed as being in 16-2n-14w, at 1 State. Contract is for 9,100 ft.

Atlas Drilling Co., Opelousas, La., will drill a 10,500-ft. test for Atlantic Refining Co. at a wildcat location 2½ miles northwest of Bayou Mallet field, in northern Acadia Parish, South Louisiana. Location is on Atlantic's Lucius LeDoux lease in 4-7s-1e.

Slim Hole Drilling Co., Casper, Wyo., has contracted for a wildcat test to be drilled for Emmett Schieck in the North Bud Kimball area, 9 miles south of Tensleep, in Washakie County, Wyoming.

Columbia Drilling Co., Houston, is keeping a rig running for Union Oil Co. of California in White Lake field, in White Lake, Vermilion Parish, Coastal Louisiana. Latest operation is at 1 Louisiana Furs-School Board Unit 3. It is an 8,500-ft. contract.

"Pressure Rated"
Plastic
Pipe
Job Engineered
To Save You
Money
Now, there's no need to buy expensive heavy-duty pipe for jobs with low pressure specifications. Southwestern's "Pressure-Rated" Plastic Pipe is Job Engineered to meet your specific needs. You select the Pressure Rating to do your job . . . you pay less because you don't buy wasted wall thickness.
You can count on "Pressure-Rated" Pipe . . . Guaranteed and manufactured to the rigid specifications that have made Southwestern the Quality Leader in the Plastic Pipe Field. And as for Safety . . . Southwestern "Pressure-Rated" Pipe is engineered with 5 to 1 Safety Factor.
Southwestern "Pressure-Rated" Pipe is available in 50, 75, 100, 125 or 150 pound pressure ratings. Call, write or wire today for complete information.
5 TO 1
SAFETY FACTOR
WALL THICKNESS
Regardless of pressure rating every pipe is manufactured to a strict 5 to 1 Safety Ratio
SOUTHWESTERN
PLASTIC PIPE CO.
A Division of Texas Vitrified Pipe Co.
MINERAL WELLS, TEXAS
PH. 2050

Concentrated to break the paraffin strangle hold!

DOWELL PARAFFIN SOLVENT

When paraffin is strangling your oil production, you need the best solvent . . . the one you can *depend* on to remove paraffin fast.

The proven, time-tested way to get rid of paraffin is with Dowell Paraffin Solvent. Thousands of experienced operators rely on Dowell Paraffin Solvent to restore production efficiency by cleaning tubing, rods, lead lines, tanks, screens, liners, perforations and the faces of formations. Dowell Paraffin Solvent is concentrated. It's specifically designed to dissolve both pure paraffin, and also deposits containing asphalt, sulphur and other foreign elements. As a result, it dissolves more paraffin at lower cost to you.

Available at both supply stores and your local Dowell station, Dowell Paraffin Solvent is easy to buy. It is packaged in 10-gallon steel drums with a spout for easy pouring.

Dowell's experienced engineers can give you expert recommendations for effective, fast solutions to your paraffin problems. Ask for the authoritative Dowell handbook on the proper use of paraffin solvents.

For more information, call any of the 165 Dowell offices in the United States and Canada; in Venezuela, contact United Oilwell Service. Or write Dowell Incorporated, Tulsa 1, Oklahoma, Department L-11.

services for the oil industry DOWELL

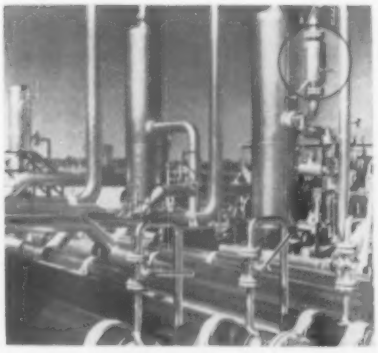
A SERVICE SUBSIDIARY OF THE DOW CHEMICAL COMPANY

the OIL AND GAS JOURNAL

Showcase

OF NEW EQUIPMENT AND LITERATURE

by Dan B. Miller



Purifier Is Designed For Gas Scrubbing

A new low-cost purifier for use in gas scrubbing, called Hi-eF Type L, is said to recover virtually 100 per cent of the recoverable liquid present in natural gasoline at a saving in capital investment of up to 500 per cent over conventional tank-type gas scrubbers.

The Hi-eF Type L separates all liquid and mist entrainment from butane, methane, propane, and other hydrocarbon gases by means of a two-stage principle of separation.

The first stage of separation employs carefully controlled impingement against a baffle which removes the larger droplets of entrainment from the gas. In the second stage of separation, the unit removes the fine mist entrainment by utilizing controlled centrifugal action. In each stage the natural gasoline and the liquid entrainment is carefully and continuously guided for maximum separating efficiency. This factor eliminates any possibility of carryover under normal operating conditions.

The 6-in. size shown is only 34 in. long and 16 in. in diameter. Since there are no moving parts in the unit, it is practically maintenance free. Entrainment intercepted by the purifier is drained automatically and continuously by means of an Anderson float-type trap.

The photograph shown here shows the initial Hi-eF Type L purifier on test at the Sweetie Peck compressor station of El Paso Natural Gas Co. The purifier is installed in a vertical down-flow position handling 3.5 m.m.s.c.f.d. of natural gas (sp. gr. 0.52) at 150 psig. 90° F., immediately ahead of a tank-type gas scrubber. **For more information write or call: V. D. Anderson Co., Department P, 1935 West Ninety-sixth Street, Cleveland 2, Ohio.**

●

Iron Powder Electrode Made For All-Position Work

A new all-position, iron powder type electrode, called Improved Fleetweld 47, has advantages of higher speeds and ease of operation comparable to those normally associated only with iron powder electrodes in downhand operation.

The new iron powder electrode is for applications where an all-around, universal type electrode is needed for welding in any position. It is claimed to surpass the performance of conventional electrodes and to give previously unobtainable iron powder results in out-of-position welds, as well as downhand.

Improved Fleetweld 47 is an electrode for the high speed welding of mild steel with ease of operation in all positions on either a.c. or d.c. welding current. Powdered iron is included in the coating to produce higher deposition rates which result in 10 to 30 per cent higher welding speeds than those obtained with conventional E-6013 electrodes. The coating also produces greater footage per electrode. Up to 30 per cent more inches of weld per electrode is claimed, meaning fewer electrode changes and higher operating factors.

the OIL AND GAS JOURNAL **Showcase Coupon**

USE THIS FORM TO OBTAIN INFORMATION ON ITEM DESCRIBED HERE

MANUFACTURER _____

ADDRESS _____

CITY _____ STATE _____

Please send me complete information on the following item

_____

_____

Described in the Dec. 19, 1955 issue of The Oil and Gas Journal

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

DATE _____

It costs so little more to "go first class"

. . . and
UNIBOLT
flow manifolds
give you so much more
for your money

Pressure-tested as a unit and available in a full range of pressures:

3000 lbs. w.p.
5000 lbs. w.p.
10000 lbs. w.p.

and in "SA" stainless steel for corrosive conditions.

● No exposed threads, concealed seat in groove . . . no accidental damage. ● All metal seals . . . not affected by high or low temperature. ● Lubricators, bottom hole pressure adapters, and valves easily attached to Unibolt Tee. ● Tee cannot be accidentally opened. ● Unibolt stronger than tubing threads . . . ideal for working trees with welded lift nipple. Tubing threads in Tee if desired. ● Wing Valve requires no grease to effect seal. ● Variable opening speeds up initial clean-up or running initial flow tests . . . saves rig time. ● Unrestricted 1" opening in Wing Valve will pass 10,000 bbls. fluid per day with 100 lbs. pressure drop. ● Valve stem packing needs no tightening . . . stem turns freely under high pressures. ● Threads on stem not exposed to internal or external damage . . . full 2½" pilot for true stem alignment and rigidity. ● Stem seat sealed by power threads and metal gasket assures alignment. ● Nitride hardened stem and stem seat . . . resists corrosion. ● Choice of hard chrome plated or "SA" stainless stems and seats. ● Positive Choke Body takes regular or "X" Beans . . . all beans flow-rated. ● Shaped entrance on beans prevents paraffin clogging. ● Positive Choke Body may be replaced with inexpensive tee and cage nipple, or can be converted to Adjustable Wing Valve by substituting two parts. ● Streamlined flow . . . no obstructions . . . no turbulence.

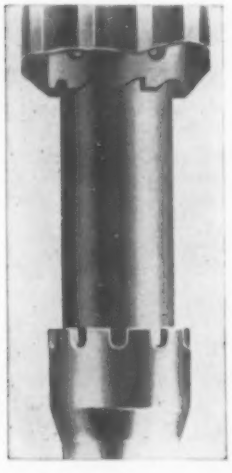
THORNHILL
P. O. BOX 1184

UNIBOLT

CRAVER CO.
HOUSTON, TEXAS

Bead appearance is smooth and clean with minimum spatter. Slag is practically self-cleaning. The arc is smooth, soft, and stable in all positions and has no tendency to stick. It can be operated with either a drag or short-arc technique. It is claimed to be especially efficient in overhead welding and in poor fit-up situations. **For more information write or call: Lincoln Electric Co., Cleveland 17, Ohio.**

•



Grant Adds Safeguard to Cushion Stabilizer

A safeguard of vital importance when drilling under adverse hole conditions has been built into the Grant cushion stabilizer. This safeguard permits quickly milling off the stabilizer boots in case the string becomes stuck below the tool. Known as the wash-over lock, it locks the rubber boots to the mandrel of tool so that the standard milling shoe used to free the stuck pipe will easily mill over the rubber. If more than one boot is being run on the tool, boots are locked to each other as well as to the mandrel.

The inner steel sleeve of each boot carries a number of ratchet teeth around its entire circumference top and bottom. In addition, the mandrel of the stabilizer has machined lugs into which the ratchet teeth will drop. Under normal stabilizing conditions, the boots ride up on the mandrel of the tool, acting as a bearing and centering the string in the hole. The boots do not turn in the hole. The centering action achieved cushions shock loads and lateral movement of the pipe and allows application of more weight on the bit for faster penetration rates without making crooked hole.

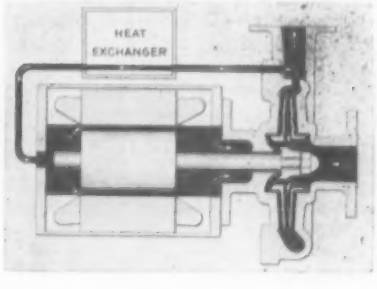
In the event of a stuck drilling string, the stabilizer's wash-over lock goes into action. The ratchet teeth on the boots

fit into machined lugs on the mandrel, preventing further independent movement. As the milling shoe rides over the boots, the boots are held rigidly in place on the mandrel. The resulting ease of washing over is obvious. Yet, when pulling up to circulate, the boots do not lock, but allow the string to run free. The wash-over lock feature operates whenever one, two, or three boots are on the mandrel. **For more information write or call: Grant Oil Tool Co., 2042 East Vernon Avenue, Los Angeles, Calif.**

•

Canned Motor Pump Utilizes Heat Exchanger

Combining an integral heat exchanger with a special high-temperature pump design, this newest addition to the line of leakproof canned motor Chempumps is ideal for handling Dowtherm,



Arochlor, hot oils, and similar fluids at temperatures as high as 1,000° F.

Pumped fluid enters the rotor chamber of the combined motor pump. However, the necked-down area between motor and pump sections provides both a thermal barrier and a narrow restriction for passage of hot pumped fluid.

A secondary impeller, mounted on the rotor, circulates rotor-chamber fluid through a water-cooled heat exchanger mounted in the circulation line. Intermixing of hot fluid in the pump chamber and relatively cool fluid in the rotor chamber is very slight. Depending upon cooling water temperature, pumps of this design can handle fluids as hot as 1,000° F. **For more information write or call: Chempump Corp., Station I, 1300 East Mermaid Lane, Philadelphia 18, Pa.**

•

Universal Expands Line Of Platforming Catalysts

Universal Oil Products Co. has announced the expansion of its line of Platforming catalysts to include two improved catalysts tailored specifically for use in the production of gasolines of 98 leaded octane number and higher. The improved catalysts, when used for the production of high octane number gasolines, give increased gasoline yields, more hydrogen, and less carbon than

The OIL AND GAS JOURNAL Showcase Coupon

USE THIS FORM TO OBTAIN INFORMATION ON ITEM DESCRIBED HERE

MANUFACTURER _____

ADDRESS _____

CITY _____ STATE _____

Please send me complete information on the following item

_____

_____

Described in the Dec. 19, 1955 issue of The Oil and Gas Journal

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

DATE _____

presently available reforming catalysts.

As in the case of earlier Platforming catalysts the improved catalysts, which will be known as Type R-7 and Type R-8, will be of low density and high activity. They will have the mechanical ruggedness characteristic of spherical shape, but will be smaller in size than present catalysts. One of them, Type R-8, available under special arrangement, will have a higher platinum content. **For more information write or call: Universal Oil Products Co., 30 Algonquin Road, Des Plaines, Ill.**

•

Knitted Electrothermal Tape Fits Any Shape

In addition to its laboratory uses, electrothermal tape is finding many new industrial applications, such as on pipes, valves, and gas cylinders. These tapes are useful for heating frozen water lines or cold oil lines.

Knitted electrothermal heating tape does not buckle and can be stretched or squeezed to fit on the equipment being heated. It can frequently be repositioned without rewinding. Knitted electrothermal tape is suitable for heating surfaces with a double curvative.

The current-carrying resistance bands are insulated on both sides by layers of knitted glass yarn. This construction makes it safe to wind electrothermal tape on metal. The insulation on both sides minimizes heat losses to atmosphere. Heating is efficient and economical. ½, 1, 2, and 3½-in. widths are furnished in lengths of 2, 4, 6, and 8 ft. **For more information write or call: Arthur S. LaPine & Co., 6001 South Knox Avenue, Chicago 29, Ill.**

Compressed Air Powers New Safety Floodlight

A new type of explosionproof floodlight powered by compressed air turbogenerators and cooled by exhaust air is especially adapted to industrial work where electric power is not readily available. The 22-lb. semiportable lamp draws 23 cu. ft. of air per minute at pressures ranging from 60 to 100 psi. Constant turbogenerator speed is maintained by special reducing valves regardless of variations in the unit's air supply.

Another special feature of the new floodlight is a filtering device which prevents foreign matter from entering the turbogenerator through its ½-in. air-supply coupling.

An automatic turbine cutoff ensures full safety in the event the blastproof lens is shattered by external impact during operation. **For more information write or call: Copco Eastern, Ltd., 151 Linwood Avenue, Paterson, N. J.**

•

Spacestat Solves Dirt And Humidity Problem

Accurate and trouble-free temperature control in installations where dirt and humidity present a problem has been attained with the introduction of the new commercial thermostat, L-37. Featuring a mercury switch, all major components, including the sensitive bimetal element, case, and cover are made of stainless steel.

Heavy-duty, light-duty, and millivolt models are suitable for general-purpose temperature control of processing equipment. Close temperature control is assured through heat anticipation on heating models and cold anticipation on cooling models. The heavy-duty model is supplied with dial lock and external adjustment knob. Light-duty and millivolt models have external adjustment holes. The unit has two conduit knockouts for wiring from either top or bottom, as required. **For more information write or call: General Controls Co., 801 Allen Avenue, Glendale 1, Los Angeles, Calif.**

•

Stainless-Steel Filter Made for Severe Conditions

A new line of porous stainless-steel filters, Poro-Klean, makes it possible to filter under unusually severe conditions, temperatures up to 1,200° F., differential pressures of 2,000 psi., and corrosive liquids or gases. The physical properties of Poro-Klean elements are: tensile strength (ultimate) 9,000 to 25,000 psi.; per cent of elongation (ductility) 3 to 6 per cent; and porosity 30 to 50 per cent. Particle size retention grades from 3 to 30 microns.

Poro-Klean filter elements are produced from spherical powdered stainless-steel alloys. The sintered materials are inspected and tested for pore distribution, particle size retention, and physical properties. They are then fabricated into filter elements and again inspected for dimensional and functional accuracy. It is possible to furnish a variety of porous metal with a wide range of properties for applications in filtration, transpiration cooling, boundary-layer controls, and other uses requiring porous metal.

Standard elements are designed to fit production line housings. Elements are either cylindrical or cell-type and respective filter areas are 0.6 sq. ft. and 2 sq. ft. **For more information write or call: Cuno Engineering Corp., Meriden, Conn.**

TRADE MARK REG. U. S. PAT. OFF.
TIME TESTED
MACCO
GAS LIFT

Telephones:

ALICE
4-4993 4-5787
MIDLAND
3-3936 2-5323
VICTORIA
Hillcrest 5-1731 WJ-53395
BEAUMONT
5-1958 ZF-78424
HOUMA, LA.
2-2147 7728 2-1285
NEW IBERIA, LA.
4-2674
HOBBS, N. M.
3-9059
*LONG BEACH, CALIF.
NE 6-4666
*LOS ANGELES, CALIF.
JE 5261
*VENTURA, CALIF.
MI 3-4033
*TAFT, CALIF.
5-3244
*Calif. Rep. Emsco Mfg. Co.

MACCO
OIL TOOL CO.
1521 PRINCE ST., HOUSTON 8, TEX.
UN 1-1253
HO 5-7585 MI 9-0747 UN 4-0777
MO 5-6809 UN 9-1397 UN 4-4939

Write or Wire
for Monthly Stock Lists

● VALVES
● PRESSURE TUBING
● STEEL

Peerless Supply Co., Inc.
L. D. 75 & 76 P. O. Drawer 36-A
Shreveport, La.

Petroleum Service Management Company, Inc.
Consulting Engineers and Geologists

Research, Evaluations, Bank Loan Reports, Investigations, Reports for Underwriting Issues, Well Supervision, Property Management, Contract Leasing, Drilling Deal Recommendations, Purchase of Proven Oil and Gas Properties. Complete management and supervision, U.S.A.-Foreign Refinery Design, Construction and Management. We handle all of your operations on straight retainer and management fee basis, or participating and retainer basis. 306 Commerce Building, Box 1992, Abilene, Texas. Phone 2-9621.

OIL AND GAS JOURNAL
Showcase

• BULLETINS
• CATALOGS
• BROCHURES

Temperature Controller. Specification Sheet 866 describes the new Ambi-Stat remote bulb temperature controllers. These provide close control with compensation for temperature differences between controlled medium and air surrounding tubing and bellows. **For more information write or call: Minneapolis-Honeywell Regulator Co., Industrial Division, Wayne & Windrim Avenues, Philadelphia 44, Pa.**

●

Fuelguard Brochure gives details on a new ashless additive and presents representative results of tests made with fuel-oil blends containing cracked stocks. Fuelguard prevents gumming and sludging, excessive darkening, and rusting in the presence of water when added to fuel oils and diesel fuels at 0.01 per cent by weight or 30 lb. for 1,000 bbl. The quality and performance of cracked fuel oils or blends containing cracked stocks is maintained with Fuelguard after more than the normal 12 to 18-month storage periods. **For more information write or call: Carlisle Chemical Works, Inc., Reading, Ohio.**

●

Water-Flooding Pumps. Choosing the right water-flooding pump for secondary-recovery operations is the subject of a new four-page bulletin, W-414-B22A. Separate rating charts present information on capacity, size, and horsepower for the selection of nine types of vertical multiplex plunger pumps with pressures up to 5,000 psi., and displacement to 40,500 bbl. per day. Information is also applicable for subsurface hydraulic pumping and salt-water disposal operations. **For more information write or call: Worthington Corp., Advertising & Sales Promotion Department, Harrison, N. J.**

●

Bottom-Hole Chemical Injector is a new, illustrated bulletin on a tool for injecting liquid inhibitor in flowing or gas-lift oil wells or in high-pressure gas wells. It is especially designed for wells with a packed-off tubing-casing annulus which usually prevents conventional

PUMPING PROBLEM

REDA
MAY HAVE THE
RIGHT ANSWER

. . . from 1/3 HP to 240 HP . . . from 20 bbls to 17,000 bbls . . . from 200' to 10,000' and more . . . Yes, a REDA may do that pumping job BETTER . . .

Reda Pumps are accepted as original equipment, or replacement equipment, because they produce at a lower cost per barrel of fluid. Whether it's large volumes from shallow depths, or modest volumes from great depths, Reda Pumps provide operating savings.

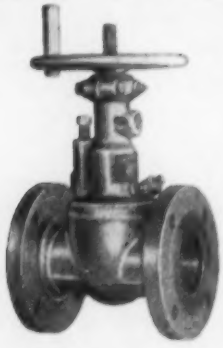
IMPROVED DESIGN:
Constant research and design improvement are responsible for lengthened operating life; corrosion resistance, low labor cost per barrel of fluid produced.

IMPROVED EFFICIENCY:
Greatly improved overall efficiencies have improved Reda performance as much as 25%; a substantial operating saving.

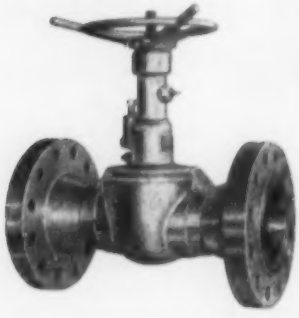
If you have a pumping problem, our engineering staff is always ready to assist you. Phone or write:

REDA
PUMP COMPANY
■
BARTLESVILLE, OKLAHOMA

ORBIT VALVES HOLD



Full Round Opening Flanged End
Sizes: 1", 1½", 2", 2½", 3", 4"



Venturi Opening Only Flanged
End. Sizes: 2", 2½", 3", 4", 6"

Screw End—full round opening
Sizes: 1", 1½", 2", 2½", 3", 4"

HYDROCARBONS

NATURAL GAS

ETHANE

PROPANE

BUTANE

ETHYLENE

PROPYLENE

BUTADIENE

BENZENE

TOLUENE

XYLENE

ORBIT VALVES ®

See 22nd Edition of Refinery Catalog for full particulars on Orbit Forged Steel ASA Class valves or write for Catalog 55-B.
A good range of sizes are available beginning with 1"

ORBIT VALVE COMPANY

P. O. BOX 699 *(For over 40 years)* TULSA 1, OKLAHOMA

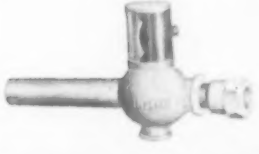
BUSINESS AND PLEASURE IN TULSA MEANS

THE MAYO

THIS FAMOUS HOTEL COMPLETELY AIR-CONDITIONED!

Forgive the Typesetter.
He's been a GUEST at
the MAYO and
is understandably excited
over the food,
the low prices,
the Hospitality!

10% to 20%
More Horsepower



INFERNO
Oil Burner

In the Inferno Oil Burner, the primary air serves the same purpose as the oxygen in an acetylene torch—to maintain a hotter fire. By maintaining this hotter fire, it is possible to get 10% to 20% more horsepower from the boiler. Write for new Bulletin No. 36.

THE INFERNO CO.
Box 1138A
115 RICOU St.
SHREVEPORT, LA.
INFERNO

treatment with liquid inhibitor. The injector tool, filled with liquid inhibitor, is dropped to bottom and flowed up the tubing. The bulletin contains complete operating details, cost comparison data, and case histories. **For more information write or call: Otis Pressure Control, Inc., P. O. Box 7206, Dallas, Tex.**

•

Remote Metering and Control. An eight-page color bulletin describes how Chronoflo Telemeters bring accurate records and control over an unlimited distance to the fingertips of plant and industry operators. Remote metering of flow, level, pressure, temperature, gate position, and weight and control of pumps, chemical feeders, valves, and levels are some of the Chronoflo functions covered in this bulletin. **For more information write or call: Builders-Providence, Inc., 345 Harris Avenue, Providence, R. I.**

•

60 Hp. Allis-Chalmers W-226. A new eight-page, two-color catalog, MS-455, gives the design, engineering and performance story of the four-cylinder, 60 hp. Allis-Chalmers W-226 power unit. Included in the catalog are specifications, cut-away views of the power package, and many of its components; photographs of the fan-to-flywheel unit, the open-style unit, and the standard unit available to meet the specific installation requirement of the user. **For more information write or call: Allis-Chalmers Manufacturing Co., Milwaukee, Wis.**

•

Modern pH Chlorine Control incorporates the theory and practice of colorimetric analysis. The pocket-size, 100-page booklet serves as a handy reference for quantitative determinations of pH, chlorine, bromine, phosphate, nitrate, sulfite, hardness, and other special tests. Slide comparators and complete test kits are illustrated and detailed methods are discussed. **For more information write or call: W. A. Taylor Co., 7300 York Road, Baltimore 4, Md.**

•

Cal-Fin Tubing. Of special interest to the chemical, oil-processing, and other basic industries is this new brochure, C-3008, on heat-exchange equipment. Highlighted are handy physical and dimensional data charts for quick selection. Featured is exclusive design advantages of serrated, helically wrapped fins. Also included are other performance claims by manufacturer of the crossflow tubing, produced by the D-H process for a wide variety of services:

LONGER
THREAD LIFE
IN EVERY BUCKET!

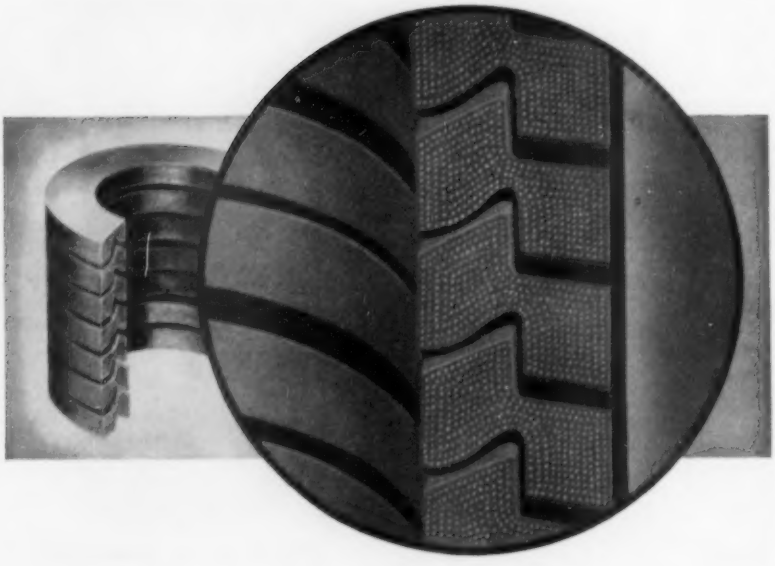
MONEY BACK GUARANTEE

MONEY BACK GUARANTEE

Sold through your favorite supply store

Use JIMMIE GRAY Dope Brushes!

PETROLEUM DISTRIBUTING COMPANY
BOX 203 - HOUSTON, TEXAS - CHarter 5648
Quality Oil Field Lubricants Available in
LA. • MISS. • TEX. • N.M. • N.D. • WYO.



Thousands of mud pump users have solved their packing problems with

R/M "VEE-SQUARE"®

R/M "Vee-Square" mud pump packings have no equal for heavy duty service. Unlike ordinary V-ring packings, they do not need any sensitive gland adjustments. The solid square section absorbs gland pressure and keeps the packing from rolling and riding the rod. The V-design assures automatic sealing; the soft rubber cushion between the rings prevents blow-by. For more effective sealing and greater rod protection, use R/M "Vee-Square" packings. * Patent Pending

If lowering your rod costs interests you, write today for our booklet showing pumps for which "Vee-Square" is available and sizes in which it is made.

R/M MAKES A COMPLETE LINE OF PACKINGS AND GASKETS AND SELLS THEM ONLY THROUGH AUTHORIZED DISTRIBUTORS

RM PACKINGS
RAYBESTOS-MANHATTAN, INC.
PACKING DIVISION, PASSAIC, N.J.

FACTORIES: Bridgeport, Conn.; Manheim, Pa.; No. Charleston, S.C.; Passaic, N.J.; Neenah, Wis.; Crawfordsville, Ind.; Peterborough, Ontario, Canada

RAYBESTOS-MANHATTAN, INC., Packings • Asbestos Textiles • Industrial Rubber, Engineered Plastic, and Sintered Metal Products • Abrasive and Diamond Wheels • Rubber Covered Equipment • Brake Linings • Brake Blocks Clutch Facings • Fan Belts • Radiator Hose • Bowling Balls

convection banks of refinery tube stills; waste heat boilers utilizing heat from stack gas; air preheaters; high-temperature aerial coolers; shell and tube gas coolers; economizers; and heat exchangers. **For more information write or call: Drayer-Hanson, Inc., 3301 Medford Street, Los Angeles 63, Calif.**

•

A Complete Gasoline-Coke Refinery. The lead article in the September-October issue of Heat Engineering describes The Texas Co. refinery at El Paso, Tex. In addition to plant illustrations, the article presents a flow diagram of the delayed coking process, and a diagram of the end products derived from the crude unit, the delayed coking unit, the catalytic cracking unit, the catalytic polymerization unit, and the catalytic reformate. **For more information write or call: Foster Wheeler Corp., 165 Broadway, New York 6, N. Y.**

•

Model F3 Oxygen Analyzer. A new brochure, Bulletin 108A, describes the F3 analyzer in detail. It shows how the F3 makes its measurement directly upon the oxygen content of the gas, not upon some remote secondary relationship. The measurement is based upon the paramagnetic properties of oxygen itself, resulting in sensitivity, accuracy, and simplicity. There are no filaments, catalysts, chemicals, or fuels to replenish; no orifices, valves, cams, or delicate mechanical parts to keep in repair or adjustment. **For more information write or call: Arnold O. Beckman, Inc., 1020 Mission Street, South Pasadena, Calif.**

•

Steam - Pyrolysis. A steam - pyrolysis process which allows the refiner to dispose of marginal products by economically converting natural gasoline, residual or other low value materials to ethylene and olefins is the subject of this new eight-page booklet. As shown in the booklet, Kellogg steam-pyrolysis results have been marked by excellent yields of high-purity olefins, in most instances higher than can be achieved by conventional cracking. At the same time, the process has a proven high on-stream efficiency. In over 3 years of commercial operation, the on-stream efficiency of the Kellogg process has averaged about 95 per cent. The 5 per cent off-stream time of the plant resulted from scheduled annual shutdowns which enabled the producer to fit these interruptions of production in with the operations of the consuming plants. **For more information write or call: M. W. Kellogg Co., 225 Broadway, New York 7, N. Y.**

First choice of men who know 6-wheel costs

Now — *NEW* Gasoline, LPG and Diesels for a total of *101* models

SF-180 Series – GVW rating, 30,000-33,000 lbs. GCW, 45,000 pounds. Gasoline or LPG engines.

RF-200 Series – GVW, 37,000-41,000 lbs. GCW, 65,000 lbs. Royal Red Diamond 212-hp gasoline engine, optional.

RDF-210-H Series – GVW rating 37,000-45,000 lbs. Diesel powered. For highway or off-highway service.

RDF-214-H – GVW rating 45,000 lbs. Diesel powered. For heavy off-highway service.

RDF-230-H – GVW rating, 60,000 lbs. Diesel powered. For heavy off-highway service.

DF-400 Series – GVW rating, 40,000 lbs. GCW rating, 76,800 lbs. Diesel powered. For highway or off-highway service.

Here are 3 BIG reasons why:

1. **World's Widest Range of 6-wheel Models.** The INTERNATIONAL 6-wheel line offers trucks of every size and type from 22,000 to 90,000 pounds GVW — conventional and COE, gasoline, LPG and diesel — all available in hundreds of variations for *exact* matching to the requirements of every job.

2. **Custom-Built on the Production Line.** Years of experience in volume manufacture has created unmatched ability for pinpoint specialization in production line assembly. This means fast completion of individualized single or fleet orders, appreciable production savings — is one of many INTERNATIONAL superiorities that have made INTERNATIONAL the 6-wheel leader for 20 straight years.

3. **All-Truck Built to Save You the BIG Money.** INTERNATIONAL 6-wheelers are *all-truck* from the drawing board out with no passenger car engines or components asked to do a truck job. They *last longer, work more dependably* – to save you the BIG money, the over-the-years operating and maintenance money.

INTERNATIONAL HARVESTER COMPANY • CHICAGO

All-Truck Built to save you the BIG money!

INTERNATIONAL® TRUCKS

Motor Trucks • Crawler Tractors • Industrial Power
McCormick® Farm Equipment and Farmall® Tractors

NOW! Get 4-way Savings with ®TAPECOAT-X

...The time-tested quality coal tar coating in tape form...now made with Xtra thickness of coal tar for Xtra savings

TAPECOAT-X is designed for today's needs in protecting pipe, pipe joints, fittings, mechanical couplings, tanks, and other surfaces vulnerable to corrosion . . . above or below ground. Available in rolls of 2″, 3″, 4″, and 6″ widths.

1

SAVES TIME and TROUBLE

TAPECOAT-X is easier to apply, saves time on the job. An exclusive new insert speeds unrolling and application. This liner disappears during the application process—never gets in your way.

2

SAVES LABOR

The extra thickness of coal tar in TAPECOAT-X permits a single-wrap application to make it go farther, faster and reduce labor costs.

3

SAVES MATERIAL

Because it can be single-wrapped and give the same effective protection as the usual double-wrap method, TAPECOAT-X covers more surface per foot of tape.

4

SAVES MONEY

With reduced labor cost, greater coverage and faster application, TAPECOAT-X saves you money right down the line.

Write for literature presenting the complete performance story on TAPECOAT-X.

The TAPECOAT Company

ORIGINATORS OF COAL TAR COATING IN TAPE FORM

1539 Lyons St., Evanston, Illinois

Products and Services of the Hagan Companies. Automatic control and instrumentation components, water conditioning and steam testing equipment, and chemical feeding devices are some of the subjects discussed in this new 28-page bulletin, GSP-901. It summarizes the products and services of Hagan and its three subsidiaries. **For more information write or call: Hagan Corp., 323 Fourth Avenue, Pittsburgh 30, Pa.**

•

General Brochure of NYAB Equipment. A new 16-page color brochure, No. 1102, illustrates and describes products from the company's full line of vacuum and liquid pumps, air brake equipment, and hydraulic motors, controls, and pumps. Abundantly illustrated with installation photographs from a wide range of industries, the booklet is intended to serve as a quick guide to equipment produced by Air Brake's five manufacturing divisions. **For more information write or call: New York Air Brake Co., 230 Park Avenue, New York, N. Y.**

•

New Snap-Tite "H" Coupling Bulletin. A new descriptive bulletin, No. 240, on quick-connect, quick-disconnect "H" coupling describes the "H" coupling, its uses and construction, with particular reference to the exclusive U-packer which gives positive seal without compression set because of rubber distortion. To aid engineers, a fully detailed cutaway of the coupling is incorporated into the bulletin. Complete dimensions of all "H" coupling parts, as well as ordering information for spare parts and complete couplings, are also listed. **For more information write or call: Snap-Tite, Inc., Union City, Pa.**

•

Organic Chlorine Compounds. A new 48-page book, F-4769, discusses the applications of 18 products, their solvent properties, and their proper handling and storage. It includes important data on physical properties, specifications and test methods, shipping information, and constant boiling mixtures. Fourteen charts contain useful physical property data. Chlorinated compounds are excellent solvents for hydrocarbons, alkaloids, and synthetic rubber. They are used in the manufacture of surfactants, lubricants, emulsion and foam breakers, resins, and other useful compounds. An important feature of this book is a list of references that gives additional sources for more detailed information on individual compounds. **For more information write or call: Carbide & Carbon Chemicals Co., 30 East 42nd Street, New York 17, N. Y.**

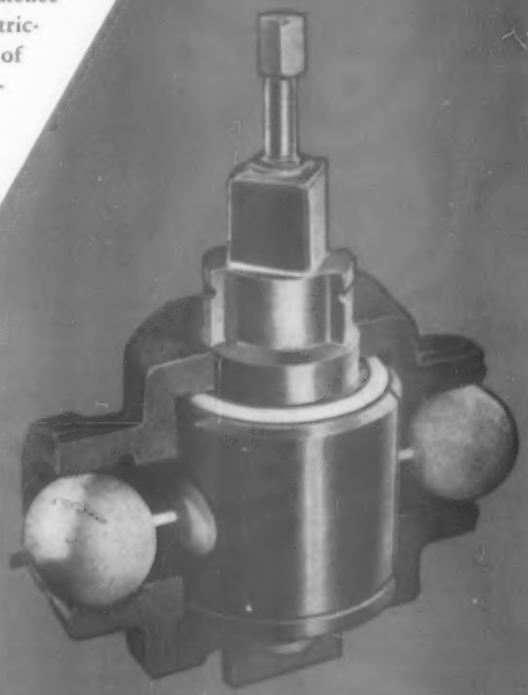
NO FUNNEL ACTION

because both acf Regular Round and acf Rectangular Port Valves have port areas at least equal to the pipe itself. Result: no turbulence to flow of viscous ladings and no restrictions to cause abrasion . . . no loss of head pressure . . . all highly desirable features throughout the processing industries.

Other important features are quick, quarter-turn shut off and Teflon* head seal gaskets, resulting in substantially lower maintenance costs.

Representatives in 50 Principal Cities are ready to show you how to keep down valve maintenance costs. Write for Catalog 5, OG-1, Valve Division, acf Industries, Incorporated, 1501 E. Ferry Street, Detroit 11, Michigan.

*DUPONT TRADE NAME



acf CYLINDRICAL FULL PIPE AREA PLUG VALVES

EQUIPMENT MEN . . . in the News

Pipelife Buys Internal Pipe Line Maintenance

Pipelife Corp., with headquarters in Tulsa, has announced the purchase of Internal Pipe Line Maintenance Co. of Louisiana-Arkansas. This company was the licensee for Pipelife in those two states.

Pipelife Corp. cleans and coats pipelines internally and in place, with a patented coating plug. The former firm will become the southern division of Pipelife. Lee Holland, former president of Internal Pipe Line Maintenance Co., will manage the division as superintendent. Headquarters are in Magnolia, Ark.

Addition of this company enlarges the scope of Pipelife Corp. operations to both Louisiana and Arkansas with field units stationed at Magnolia, heart of oil operations in this area.

Borel Joins McKee As Sales Engineer

Frederick C. Borel, III, has joined Arthur G. McKee & Co. as sales engineer in the Industrial Engineering Division. Borel previously had held a similar position with H. K. Ferguson & Co. For 16 years Borel has been associated with major construction activities throughout the United States.

McKee's Industrial Engineering Division was organized about 18 months ago to handle new engineering and construction business in industries other than steel, petroleum and chemical, the major activities of the 50-year-old company. During this period, the division has grown to a staff of about 40 designers and engineers with broad experience in a number of fields, including aluminum and other nonferrous plants, atomic power and nuclear research facilities.

American Radiator Forms Ross Heat Exchanger Group

The formation of the Ross Heat Exchanger Division of American Radiator & Standard Sanitary Corp., with headquarters in Buffalo, N. Y., has been announced by Joseph A. Grazier, president of American-Standard. The new division will conduct the operations in the heat-exchanger field formerly carried on by Kewanee-Ross Corp. This firm is being dissolved in accordance with the policy of divisionalizing American-Standard activities along major product lines. At the same time, the Kewanee Boiler Division is being established to conduct the steel-boiler activities of the dissolved company.

Officers of the new Ross Heat Exchanger Division are: John C. Linsenmeyer, president; Richard S. Reade, executive vice president; John W. Gudgel, vice president, sales and marketing; and Townsend Tinker, vice president, engineering, research, and development.

Linsenmeyer is president of American Blower Corp., also a division of American-Standard, and will continue to serve in that capacity. Both Gudgel and Tinker have been active in the heat-exchanger industry for many years. They have been serving as vice presidents of Kewanee-Ross Corp.

Creation of the new divisions brings to 10 the number of American-Standard operating divisions in the United States. The corporation also has operations in Canada and Europe.

J&L Supply Moves Dallas And Houston Offices

Moving of the Jones & Laughlin Supply Division sales office in Dallas from the Fidelity Union Life Building to larger quarters in the Republic National Bank Building has been announced by Rainey Elliott, president of the firm headquartered in Tulsa. He also announced the central office of Gulf Coast operations in Houston has been moved from the Melrose Building to the Texas National Bank Building.

The Supply Division maintains quarters in a 1,600-sq.-ft. area on the 16th floor of the new Dallas building in conjunction with its parent corporation, Jones & Laughlin Steel Corp.

Sales personnel headquartered in the new office since November 1 include: Guy A. McDaniel, sales office manager; Frank J. Kopp, general salesman; Frank B. Barnett, salesman; and A. W. Hail, salesman, J&L products.

The Houston office is under the management of H. H. Wilson, director, Gulf Coast operations. D. T. Ottinger, district sales manager, supervises the firm's sales activities in the South Texas area.

Daily Named Halliburton's E-W-S Manager at Lubbock

LEON DAILY

Appointment of Leon Daily as manager of electrical well services for the Lubbock division of Halliburton Oil Well Cementing Co. has been announced by Wilfred Tapper, vice president for electrical well services. Halliburton's Lubbock division includes the Lubbock area of Texas and all of New Mexico. Present electrical well services locations in the division area are at Brownfield, Tex., and Hobbs, N. M.

The new electrical well service division manager was EWS district superintendent at Duncan, Okla., prior to his new post. He will maintain his offices at Lubbock.

Oakite Appoints Hudson and Tschupp to Petroleum Group

Joe D. Hudson, formerly special petroleum representative in the South for Oakite Products, Inc., has been promoted to the new post of field manager of the industrial cleaning firm's petroleum-service division. R. E. Tschupp has been appointed headquarters representative in New York to assist Hudson in the servicing of cleaning problems in the oil drilling, refining, and transporting industries.

JOE D. HUDSON

R. E. TSCHUPP

Lloyd A. Blankenship will continue to serve as special petroleum representative in the southern California area.

Hudson, who will continue to make his headquarters in Dallas, was previously assistant to the mechanical superintendent of a major refinery and has been a refinery construction engineer. Tschupp has held several sales positions in the Oakite New York offices.

Clark Names Michelson To Manage Tulsa District

Clark Brothers Co. has announced the appointment of Charles J. Michelson as district manager of the Tulsa office. For the last 11 years Michelson has been active in the heavy oilfield machinery and compressor phases of the business. He also has worked extensively on engine development, including a stint with the U. S. Navy at Annapolis as a test engineer.

Michelson's Tulsa teammate will be J. R. Williams who has been associated with the office for a number of years and has been named assistant district manager.

PGAC Opens Branches in Fort Worth and Tulsa

Paul Charrin, president of Perforating Guns Atlas Corp., announced that the company has opened new branch

B. O. BISHOP

P. STOORE, JR.

offices at Fort Worth and Tulsa. The new Fort Worth office is in the Continental Life Building. Bryan O. Bishop, technical representative, is in charge. PGAC's new Tulsa office is in the Enterprise Building. Philip Stoore, Jr., technical representative, is in charge of that office.

J. H. Castel, executive vice president of the Perforating Guns Atlas Corp., announced several additional personnel promotions and transfers recently effected. Paul Felder, sales representative at the company's Lake Charles office, and a perforating engineer prior to joining PGAC, has been transferred to the Shreveport office to serve in the same capacity. Charles Melvin, PGAC sales representative for the past year at Liberal, Kans., was recently transferred to the company's station at Great Bend, Kans., to serve in the same capacity.

Armour Names Bradford Supply in Tristate Area

Bradford Supply Co. has been appointed tristate sales agent for the Chemical Division of Armour & Co. J. M. Hoerner, division general manager, said the move reflects the increased use of Armour chemicals in 60 secondary oil recovery water flooding operations in Illinois, Indiana, and Kentucky. Warehouse stocks will be maintained at Robinson, Ill., and Owensboro, Ky.

Leslie Barnhart will be in charge of Bradford's operation and he will have the assistance of the Armour laboratory and technical service organizations.

Oilwell Announces Several Changes in Two Areas

Several appointments and transfers have recently been announced by M. F. Jones, Gulf Coast area manager, and Donald S. Grubbs, California area manager of U. S. Steel's Oil Well Supply Division.

In the Gulf Coast area, George L. Fabj has been shifted from city representative at Houston to New Orleans, La.; Amos, L. Savoy has been named field representative at Eunice, La.; Edison P. Thibodeaux has been appointed field representative at New Iberia, La.; Billy G. Kelly has been named field representative at Pettus, Tex.; and Joseph P. Higgins has been appointed store manager of the Mirando City, Tex., store.

In Oilwell's California area, Norman G. Kirkland was named assistant to the area manager; Thomas L. Campbell was named assistant manager, tubular sales, Los Angeles; James H. Renfro, Jr., and George S. Stewart have been appointed district representatives at Ventura, Calif.; and Francis J. Miller has been named store manager of Oilwell's store at Bakersfield, Calif.

Fabj was employed in 1943. He became district material supervisor, installation supervisor, district merchandise manager, and in 1952 was appointed city representative at Houston.

Savoy joined Oilwell in 1954 at Eunice, where he was located prior to his present appointment. Thibodeaux was employed by Oilwell in 1954 at New Iberia. Kelly joined the division in 1953 at Pettus. Higgins, who was employed by Oilwell in 1947 at Freer, Tex., became field representative and was made district representative in 1953.

Kirkland was employed in 1948, becoming field representative, city representative, and assistant district manager in 1953. Campbell joined Oilwell in 1937. He resigned in 1947, returned in 1952 as assistant district manager. Renfro was employed by the division as a field representative in 1953.

Stewart was employed in 1935. He became assistant manager, store manager, field representative, district representative, and assistant district manager in 1952. Miller was employed by Oilwell in 1951.

Anderson and Flaxbart Advanced by Western Supply

Advancement of E. D. Anderson and E. W. Flaxbart within the management structure of the Heat Exchanger Division of Western Supply Co. has been announced by James E. Hughes, vice president in charge of the division. Anderson, who has served Western for

E. D. ANDERSON

E. W. FLAXBART

the past 7 years as chief engineer, has been promoted to manager of the Heat Exchanger Division. Flaxbart will assume the chief engineer's responsibilities, vacating the post of chief rating engineer which he has held for several years.

Anderson first joined Western in 1947 after he had been engaged in heat transfer research and rating engineering for Brown Fintube Co. Previously, he had been associated with Shell Oil and Fraser Brace Engineering Co.

Flaxbart became affiliated with Western's heat-exchanger division in 1951 and advanced steadily through the rating section until promoted to chief rating engineer.

Shaffer Tool Opens New Oklahoma City Shop

Shaffer Tool Works, manufacturer of high pressure drilling equipment, formally opened its new shop and offices in Oklahoma City early in November. Opening day, Shaffer Tool Works played host to several hundred of their oil and business friends.

Present from Brea were: Donald U. Shaffer, president; Mrs. Esther M. Sandman, director; Mrs. Elizabeth R. Wilson, director; J. Robert Langston, secretary; and John Vertson, manager of Plant II.

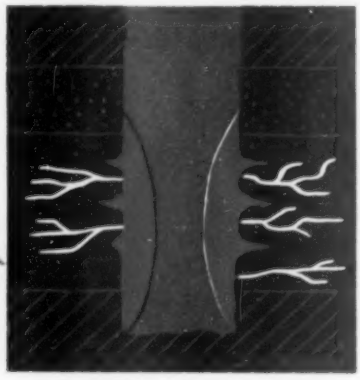
The new shop, under the management of Clay Fry, will be used for sales and service of Shaffer oil tools to all operators and contractors in the Oklahoma area.

DAMS UP
UNWANTED FORMATION WATER

HALLIBURTON'S

DOC

(DIESEL OIL CEMENT)



Sealing-off unwanted water is the job for Halliburton's DOC. Its high compressive strength on setting makes it a longer lasting, more valuable production tool.

SELECTIVE WATER SHUT-OFF MATERIAL

DOC never sets in a well until penetrated by water. For this reason it is applicable in any depth well by preceding and following the slurry down hole with a cushion of oil. This cushion keeps it from water contact until it is positioned next to the formation producing water. Then it actually has a sponging action which attracts water to it. As the water is absorbed into the slurry, oil is displaced and the slurry thickens and sets.

This consistently successful slurry is a combination of Portland Cement, Diesel Oil (or kerosene) and a highly effective surfactant. The surfactant permits addition of twice as much cement in a given amount of oil and further improves the absorptive qualities of the slurry. Since it does not begin to set until water penetrated, it has unlimited thickening time when handled under the proper conditions. And in many cases less slurry is required than with conventional water slurries.

Reduce your water-caused production problems. Dam up unwanted water with Halliburton's DOC. Call your local or district office of the Halliburton Oil Well Cementing Company.

COMPLETE DATA SENT ON REQUEST

Get this valuable information for your Halliburton Service File.

HALLIBURTON CEMENTING SERVICES

250 SERVICE CENTERS – JUST MINUTES AWAY FROM ANY RIG

EXPLORATION

New Sooner Trend Stretches 30 Miles

by John C. McCaslin

NORTHERN Oklahoma has stolen a goodly portion of the state's 1955 exploratory show. After a 3-year period of wildcat solitude, the northern tier of counties from Grant west to Woods County is commanding new exploratory interest. A forward glance into the new year indicates another round of significant strikes and subsequent development in this northeastern Anadarko basin region.

The nucleus of this northern play is a sizable basal Pennsylvanian sand oil and gas-distillate reservoir that is rapidly building up along a 21-mile east-west trend just south of the Kansas line in Grant and Alfalfa counties in the Eureka district.

An oil discovery . . . Earlier this year Viersen & Cochran opened what has been called the first basal Pennsylvanian **oil** production in the area west of the Nemaha granite ridge in northern Oklahoma.

The 1 Burghardt, located in the west part of 28n-8w, Grant County, flowed oil from the basal Pennsylvanian sand near 4,800 ft. This well is in Southeast Eureka pool, opened in 1953 at the 1 Melcher, 18-28n-8w. The discovery well at Southeast Eureka flowed 2,600 M.c.f. of gas per day plus 4 bbl. of distillate from 18 ft. net pay of basal Pennsylvanian sand topped at 4,930 ft.

There is some question as to the specific age of the basal Pennsylvanian sand in the Eureka area's wells. Some have called it Bartlesville, Cherokee, and Red Fork. Others just labeled it basal Pennsylvanian.

And a reworked hole . . . Late last year Continental Oil Co. drilled a wildcat in SW NW SE 8-28n-9w, Alfalfa County. The 1 Maltbie was abandoned in the Arbuckle. This year the hole was reworked, and it flowed 417 bbl. of distillate per day plus 32,500 M.c.f. of gas from perforations in the basal Pennsylvanian at 4,904-19 ft. The Continental success pushed the Eureka trend west into Alfalfa County.

The westernmost anchor of the chain of Pennsylvanian producers is Jones, Shelborne & Pellow's 1 Ohio-Parr in 9-28n-10w. That worked-over well opened Amorita pool with Layton-Pennsylvanian and Mississippian chat oil production.

Set off a promising campaign . . . Calvert Drilling Co. and Woods Petroleum Co. moved the new development into the east part of 28n-8w.

In northwestern Grant County Calvert and Woods 1 Leisure, SE SE SW 9-28n-8w, flowed 1,373 bbl. of oil per day from perforations at 4,873-83 ft. Another Calvert-Woods well made 160 bbl. per day. Later the development moved to its easternmost anchor at Woods 1 Conrady in 28n-7w. That well made 32 bbl. of oil per day from the Bartlesville sand.

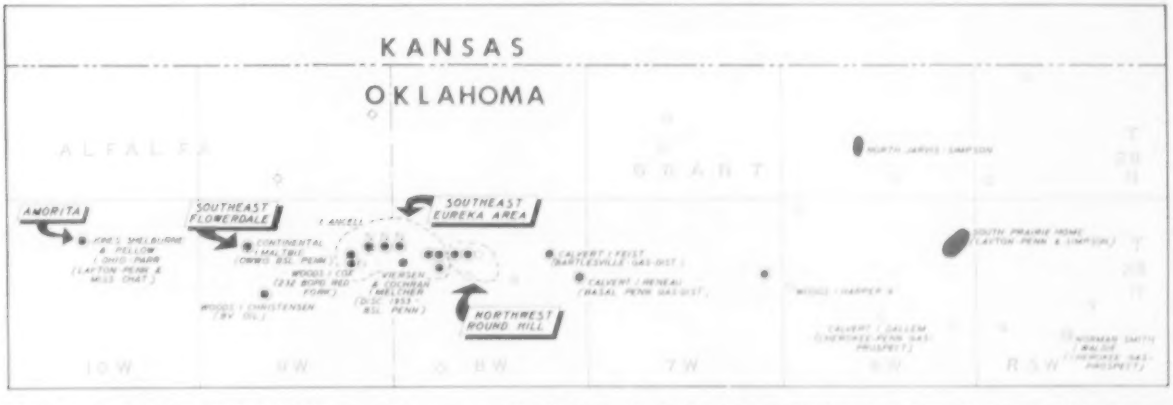
Crossing over into Alfalfa County, Woods added a 65-bbl. per hour well to the chain at 1 Cox. The other wells were completed in 13-28n-8w and 12-28n-9w. High gas ratios and prolific oil flows (more than 30 bbl. per hour) were reported at these two producers. Woods has completed 1 Christensen in 21-28n-9w, Alfalfa County, to flow 14 bbl. per hour from the Bartlesville sand.

There are now indications of the trend moving 9 miles further to the east, making it nearly 30 miles in length. Norman T. Smith has an indicated Cherokee gas discovery at 1 Waldie in NE NE NE 30-28n-5w, Grant County. Sunray Mid-Continent 1 Switser, 8-28n-8w, in Northwest Round Hill field, Grant County, flowed 118 bbl. of new oil in 16 hours from basal Pennsylvanian. Sunray also has a prospective producer at 1 Ancell in 12-28n-9w, Alfalfa County.

Increased development and wildcatting are planned across 28n-8w and 28n-9w. Calvert is drilling in the western part of Grant County with wells in 28-28n-5w and 28-29n-7w.

With an attractive objective . . . These basal Pennsylvanian sands in the Eureka area offer good prospects for more comparatively shallow and attractive reservoirs.

The pay sand ranges from 10-30 ft. in thickness. Permeabilities and porosities are good. Average depth of the pay sand is 4,900 ft. Basal Pennsylvanian sands such as the Red Fork and Bartlesville are highly prolific in Oklahoma. Both these sands have long colorful histories as oil producers in the state.



ONE OF THE MOST SIGNIFICANT new discovery areas in Oklahoma is the basal Pennsylvanian oil and gas-distillate trend building up along a 21-mile east-west line through northern Grant and Alfalfa counties. Two more possible strikes promise a 9-mile extension to the trend.

Emergency Jack is Useful Tool in Oil Fields

4-Way Simplex Model Handles Variety of Lifting and Pulling Jobs

WITH 15-tons of lifting capacity on the cap, on a capshoe, on the serrated toe and from a chain sling attached to the cap, the Model 310-A Simplex Jack eliminates the need for a number of special purpose jacks in the oil country. Drillers find it the answer for a variety of jobs such as lifting and leveling rigs, skidding, moving machinery, pulling, positioning and supporting pipe. Because the jack can be tilted on its base, lifting or pushing can be done at *any* angle. The jack is equipped with a convenient carrying handle. A double lever socket permits use in close quarters.

The Emergency Jack is only one of a complete line of Simplex Jacks for every purpose. Others include the remotely-controlled Re-Mo-Trol pump and puller, the famous Jenny self-contained "Center-Hole" puller, and standard hydraulic and screw jacks. They are all listed in the new Simplex General Catalog No. 53. Write for a free copy.

TEMPLETON, KENLY & CO.

2539 Gardner Road • Broadview, Illinois
A. C. Templeton, 5627 Del Roy Drive, Dallas, Texas

USE KINZBACH MILLS for every cutting or milling job

Type "A" Mill

Type "D" Mill

Type "H" Mill

Type "I" Mill

Use Kinzbach Milling Tools for every whipstocking or metal cutting operation. Bodies are made of high quality steel, shaped for best cutting results. They have high-speed tool steel inserts which are ground and set at the most efficient angle for fast, uniform cutting action. Shown here are four popular models—see your Kinzbach Catalog for a description of the complete series of Kinzbach milling tools.

KINZBACH TOOL CO INC

Export Office: 74 Trinity Pl. New York, N.Y.

KINZBACH TOOL CO., INC. • P. O. BOX 277 • HOUSTON, TEXAS

Recommended Reading

THE OIL BUSINESS AS I SAW IT

By W. L. Connelly.

For more than sixty years W. L. Connelly has been active in the oil business. His jobs have ranged from raw roustabout to vice president and chairman of the board of the Sinclair Oil and Gas Company. The oil business as we know it today has developed under his observant eyes. The story he tells is at once authentic, lively, and amusing.

177 pages, illustrated: $3.75

Send your order and check to

Reader Service Department

THE OIL AND GAS JOURNAL

Box 1260 Tulsa, Okla.

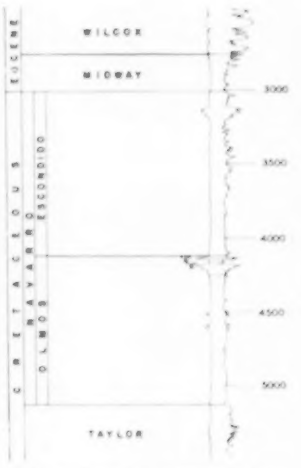


FIG. 1—Type log, Southwest Texas.

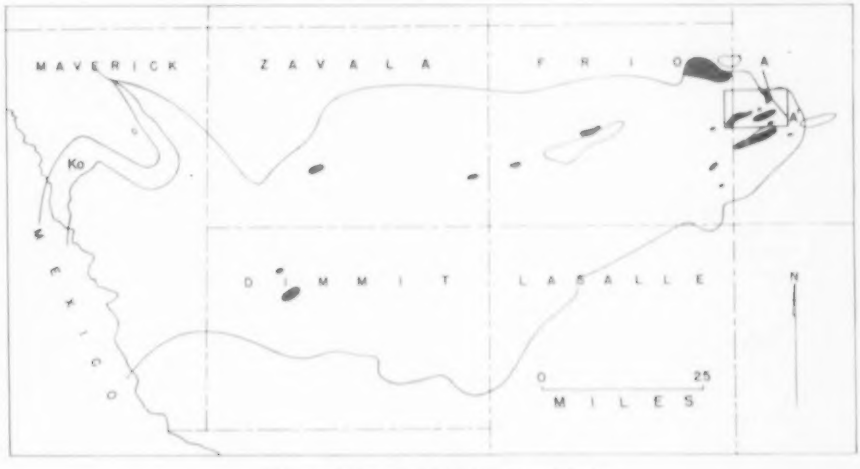


FIG. 2—Index map of Olmos sand facies.

New methods focus attention on . . .

South Texas' Thriving Olmos Trend

by J. E. Glover

THE Olmos formation occupies the lowest 1,000 ft. of the Navarro group in the subsurface of southwest Texas. It consists of relatively thin sand members interbedded with massive shales.

Oil is produced primarily from the two uppermost sand members. The areal extent of these sands is limited in the subsurface by depositional and erosional factors. These, together with faulting, provide the conditions necessary for accumulation.

Exploration has been stimulated greatly in the past 5 years by the successful use of formation fracturing in stratigraphic traps. The resulting production has accounted for nearly a third of the oil produced in the 20 years of Olmos production. The increased activity of recent years is expected to continue as both structural and depositional conditions are better understood.

Author is with Ohio Oil Co., San Antonio. This paper is presented by permission of the Gulf Coast Association of Geological Societies. It was given at the association's fifth annual meeting in Biloxi, Miss.

Olmos Sand Facies of Southwest Texas

The Olmos sand of lower Navarro age is an oil reservoir of southwest Texas which has gained local importance in the past few years due to improved methods of exploitation. To date, more than 25,000,000 bbl. of oil ranging in gravity from 30° to 50° have been produced from the formation. Nearly one-third of this was discovered within the past 5 years. Ultimate recovery from known fields is estimated at 40,000,000 bbl.

The Olmos section consists of sands and shales occupying the lowest 1,000 ft. of the Navarro group in southwest Texas (Fig. 1). It is overlain unconformably by the upper Navarro Escondido formation and rests on the Taylor, next older Cretaceous group. It is of the same approximate age as the Nacatoch of Arkansas, Louisiana and northeast Texas.

Practically all of the Olmos oil produced to date has come from the two upper sand stringers known as Olmos "A" and Olmos "B" sands. Other, lower stringers are not persistent and production from them has not as yet assumed much importance.

Outcrop and areal extent . . . The index map (Fig. 2) indicates the outcrop of the formation in Texas and the areal extent of the A and B members in the subsurface. Fields shown in solid black produce from these two sands; fields left blank from Eocene and other Cretaceous horizons. Near the

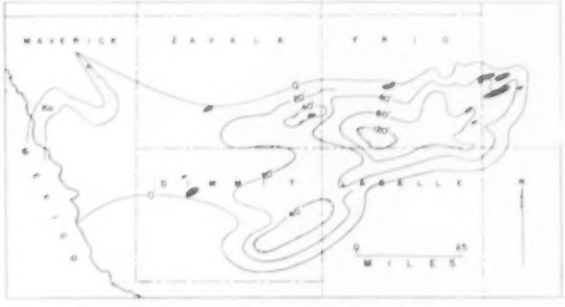


FIG. 3—Isopach map, Olmos "A" sand, 40-ft. contours.

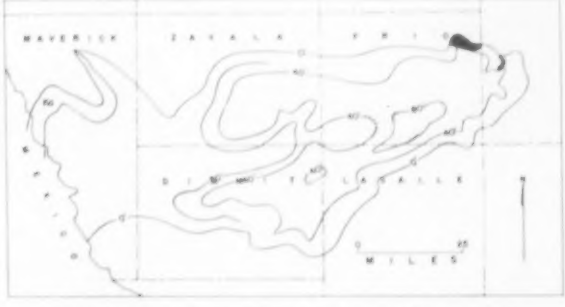


FIG. 4—Isopach map, Olmos "B" sand, 40-ft. contours.

eastern subsurface limits of the sands under discussion, there is outlined an area which will be detailed later. The line A-A' marks the position of a dip section which will also be discussed.

On the outcrop, the Olmos formation consists of 400 to 500 ft. of nonmarine marginal sands and clays with seams of coal, one of which has been profitably mined in the past. As it proceeds northeastward beneath the surface into the Rio Grande embayment, it thickens to a maximum of 1,000 to 1,200 ft. and a maximum to marine, neritic facies suggestive of shallow-water deposition.

Cores taken from wells within the sand limit show A and B horizons to be composed of gray, friable, silty sands containing disseminated specks of lignite and glauconite. Permeabilities in the vicinity of the sand limits shown range from 10 to 75 md. with the majority of pay sections having values of 10 to 25 md. Permeability is greater away from the limits. It ranges from 40 to 130 md. Porosity throughout the depositional area appears to be uniform at about 24 per cent.

Thickness . . . The variation in total thickness is reflected by corresponding thickness changes in individual members. Figs. 3 and 4 show 20-ft. isopachs of A and B sands, respectively, together with fields producing from each. It will be noted (1) that both the density and size of the fields increase eastward from the outcrop, and (2) that they show an affinity for the east and northeast sand limits. One reason for this is that nearer the outcrop, the occurrence of the sands is erratic compared with conditions to the east, and the sands are thinner. Another reason is that to the east there are structural and stratigraphic features which may not be present to the west.

Structural features . . . The structural features referred to are illustrated in Fig. 5, which portrays contours on the A sand at 500-ft. intervals. Extending into depositional area from Atascosa County on the east is a fault trend which controls a large share of the oil and gas accumulation of the entire area. It accounts for Austin and Edwards (Cretaceous) and Eocene as well as Olmos production. The stratigraphic features are the sand limits shown coupled with permeability barriers.

Examination of electric well logs reveals a rather abrupt disappearance of both A and B sands as fairly definite boundaries are approached. This is particularly true along the eastern and northeastern edges of the depositional areas as shown on the isopach maps. To the eastward, both sands change into shale over short distances. Neither A nor B Olmos is found east of Charlotte field, where A sand is one of the reservoirs.

To the northeast, the change is more gradual and the sands do not appear at the same updip positions. This fact accounts for the relative positions of Pruitt and North Charlotte fields (which produce from the A sands) and South Crown, East Crown, and Big Foot fields (which produce from the B sand).

To illustrate the pinching out of the two sands, a north-south dip section (Fig. 6) along line A-A' has been prepared. On this section, A and B beds and a deeper sand, C, have been labeled. The horizontal and vertical scales are indicated in the figure, and

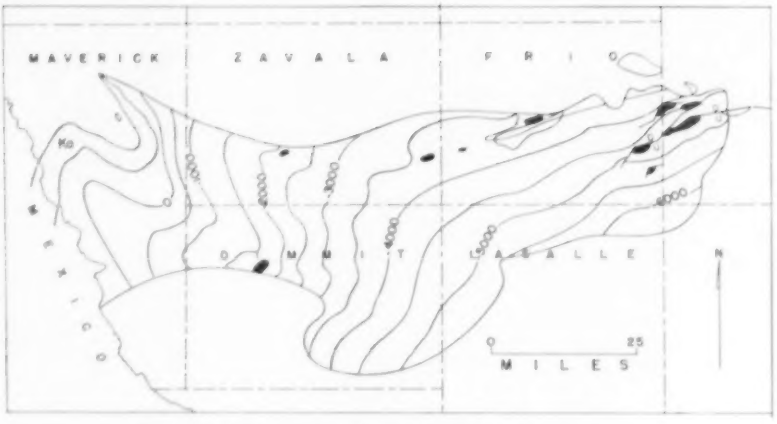
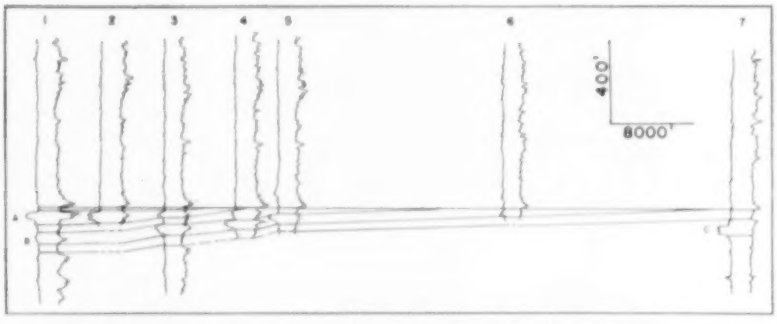


FIG. 5—Structure map, Olmos "A" sand, 500-ft. contours.



North-south dip section showing updip pinchout of Olmos sands.

FIG. 7—Pruitt-North Charlotte area, 100-ft. "A" sand contours.

WORLD'S DEEPEST OIL WELL!

Richardson & Bass Drilling Rig No. 25 at well known as Richardson & Bass (Louisiana Account)—John W. Mecom —Freeport Sulphur Company—Humble-Louisiana Land & Exploration—State Lease 2414, No. 1-L. Rig and boilers are mounted on two huge barges sunk to bottom of marsh to provide firm foundation for operations.

Record depth of over four miles attained in Richardson & Bass Louisiana Well using J&L Drill Pipe and J&L Wire Rope exclusively

Wednesday, November 9, 1955, marked another milestone in the spectacular history of the oil industry. On that day, Richardson & Bass and their associates in this enterprise, John W. Mecom and Freeport Sulphur Company, broke the world's record for deep drilling in their well in Plaquemines Parish, Louisiana, 35 miles southeast of New Orleans.

This well, now more than four miles deep, has penetrated the earth to depths never before explored. Pressures are being encountered to which drill pipe never before has been subjected.

In discussing this new world's record well, J. E. (Ed) Hill, General Manager of Richardson & Bass Drilling and Producing Interests, said: "This well has been drilled from the surface to its total depth without a single pipe failure, a tribute both to the skill of the drilling crews, and to the quality of the pipe used."

Every foot of the drill pipe in the well is J&L Drill Pipe. To a depth of 13,655 feet, J&L Blue Ribbon Drill Pipe was used. From that point to the bottom, the string was replaced with J&L Blue Ribbon Vanadium Drill Pipe. Every foot of the wire rope which supports the entire four mile string of drill pipe is J&L Permaset Wire Rope. Hundreds of tons of J&L Casing have been set in the well, with additional hundreds of tons standing by for use when the well is completed.

To provide the high strengths needed in oil country tubular products for today's deep well drilling, J&L developed and has in operation extensive new finishing facilities—facilities which are already being expanded to keep pace with the oil industry's growing needs.

Interesting facts about world's deepest well

(As of November 28, 1955)

Total depth 22,209 ft., nearly 4¼ miles, equal to height of 15 Empire State Buildings . . . previous record depth 21,482 ft. . . . drilling began February 26, 1955 . . . total drilling time 205 days . . . total testing time 71 days . . . total elapsed time 276 days . . . bottom hole pressure 20,650 lbs. per sq. inch . . . bottom hole temperature 350° F. . . . time required to pull entire string of drill pipe to surface, replace bit and reset pipe is about 11 hours . . . stretch in drill pipe at extreme depth is about 20 feet . . . total cost of well estimated at between $1¼ and $2 million.

Jones & Laughlin
STEEL CORPORATION — *Pittsburgh*

the datum is the overlying unconformity referred to earlier.

Though shown as a horizontal line for illustrative purposes, the unconformity follows the regional dip, and changes in subsurface elevation along the line of section from minus 4,841 ft. at the south end to minus 2,730 ft. at the north.

As the underlying A and B sands follow the unconformity updip, they pinch out against it, leaving C sand to continue on to its eventual disappearance in a similar manner. C sand produces small amounts of heavy crude in fields a few miles to the north of this section. It is not as promising as either A or B, nor does it have their regional persistence or areal extent.

Structural and stratigraphic agencies are responsible for Olmos production, as mentioned before. They can both be seen in Fig. 7, which covers the outlined area on the index map. Pruitt and North Charlotte fields produce from the Olmos A sand, the updip limits of which are shown. Other production to the north is from the B sand, near its pinchout position at South Crown field.

Faulting . . . Faulting is the controlling factor at Pruitt, though a few wells have been rendered unproductive by sand conditions. The large down-to-the-south fault is a part of the general fault zone mentioned earlier. A number of fields have been located along it, and until the past 4 or 5 years these fields accounted for most of the region's production.

. . . North Charlotte. At North Charlotte field, it is primarily the pinchout of the Olmos A sand, together with accompanying permeability changes, which are the salient features. The first well in the present environs of North Charlotte was drilled in 1948, produced small amounts of oil from the Olmos for a few months, went dead, and was plugged. Interest in the area abated.

. . . Big Foot. Shortly thereafter, Big Foot field in northeastern Frio County was discovered along what was proved to be a portion of the B sand pinchout. For about 2 years, until 1951, the wells in this field were poor, giving up from 10 to 25 bbl. of oil per day. But, in that year, formation fracturing was introduced. It increased production to as much as 90 bbl. of oil per day, flowing through 10/64 in. choke.

In 1953, San Antonio operators, having seen the effectiveness of Stratafrac process in Big Foot field, moved in a rig 150 ft. east of the plugged well at North Charlotte. The sand was fractured using 15,000 lb. of sand and 4,000 gal. of gel. It pumped 91 bbl. oil per day, 39° gravity, through a ⅛-in. choke from open-hole interval 4,969-5,003 ft., or 34 ft.

Completion Practices

Completion practice in the field is to get either 4½ or 5½-in. casing through the sand and fracture through perforations. All but a few of the wells are flowing, and initial production through ⅛-in. choke is about 115 bbl. per day, 38° crude.

Later developments are the fields at South Crown and Crown. Completion practice there calls for fracturing through perforations with up to 60,000 lb. of sand and around 4,000 gal. of gel. Reserves at Crown field are estimated at 200 bbl. per acre foot with 21 ft. of B sand present. This 4,200 bbl. per acre is from the moderate drilling depth of 4,300 ft. and is therefore a profitable investment.

Present Olmos Exploration

Most of the Olmos exploratory efforts are being directed at finding further accumulations of oil along the updip pinchouts of the sands. Even so, continued drilling to the southwest

The hand-applied tool joint with

"4 POINT SEAL" Protection

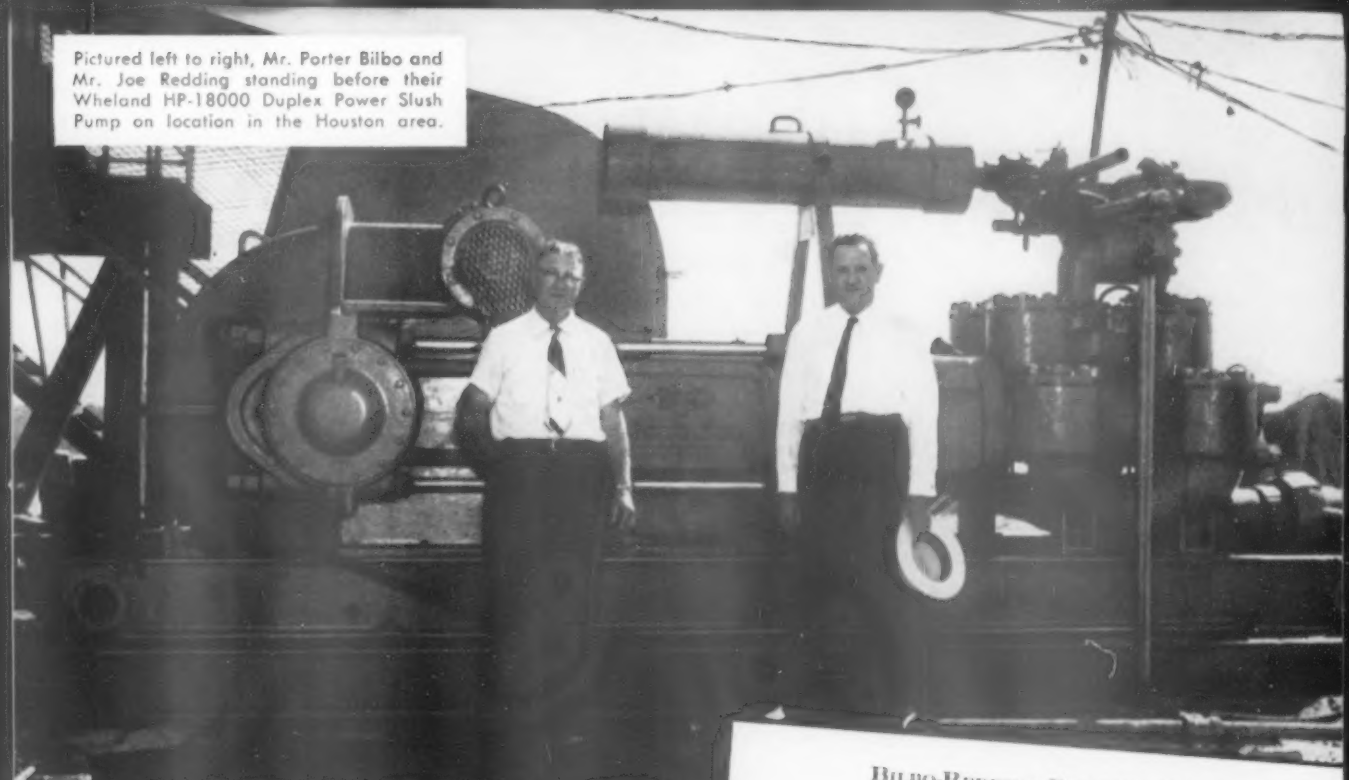
AMERICAN

Straight Grip

TOOL JOINT

In areas where tool joints must be replaced before the drill pipe is retired—or where tool joints outlast the drill pipe, American Iron hand-applied Straight Grip tool joints offer your best investment.

Precision machining and accurate gaging guarantee the perfect 4-POINT SEAL PROTECTION against joint leakage and creep—these seals actually become tighter as pump pressures increase. When replacement of Straight Grip tool joints is necessary, the worn ones are removed and new ones applied right at your rig!



Pictured left to right, Mr. Porter Bilbo and Mr. Joe Redding standing before their Wheland HP-18000 Duplex Power Slush Pump on location in the Houston area.

"Achieved the *utmost* . . . in *rugged service* . . . *day in and day out*"

—J. E. Redding, President
Bilbo-Redding Drilling Co., Inc.

BILBO-REDDING DRILLING CO., INC.
POST OFFICE BOX 3018
HOUSTON 1, TEXAS

August 11, 1955

Mr. Gordon P. Street, President
The Wheland Company
Chattanooga, Tennessee

Dear Sir:

We thought it only fitting and proper that we should advise you concerning the operations of our Wheland HP-18000 Heavy Duty Power Slush Pump purchased several months ago.

This pump has achieved the utmost in our expectations and requirements for the rugged service which it is called upon to perform: each hour of each day, day in and day out.

Our footage costs are down and our drilling profits up. To our firm this can mean but one thing, the survival of the Contractor which is so essential to the great Oil Industry. The only answer to the newly increased cost of equipment and labor to the Contractor is for mechanical research to continue in the development of equipment that will perform a more efficient job such as The Wheland Company has done in the presentation of your HP-18000 Pump.

Sincerely Yours,

Bilbo-Redding Drilling Co., Inc.

J. E. Redding

J. E. Redding, President

DEPENDABLE!
LOWER MAINTENANCE!
INCREASED PROFITS!

WHELAND HP-18000

7¾" x 18"

DUPLEX POWER SLUSH PUMP

750 Horsepower—Nominal Input at 60 RPM

1322 lbs. mud pressure with 7¾" liner
2700 lbs. mud pressure with 5½" liner

Weight 36,377 lbs. Compact—Easily Moved *In One Piece*! Write For Detailed Bulletin

WHELAND

ROTARY DRILLING MACHINERY

THE WHELAND COMPANY, CHATTANOOGA, TENNESSEE, U. S. A.
DRAW WORKS • SLUSH PUMPS • ROTARIES
CROWN BLOCKS • TRAVELING BLOCKS • SWIVELS

DOMESTIC DISTRIBUTORS: INDUSTRIAL SUPPLY COMPANY, INC.—Main Office: Wichita Falls, Texas • HOUSTON OIL FIELD MATERIAL COMPANY, INC.—Main Office: Houston, Texas • JONES AND LAUGHLIN STEEL CORPORATION, SUPPLY DIVISION—Main Office: Drawer 2481, Tulsa 2, Oklahoma.
EXPORT DISTRIBUTORS: LUCEY EXPORT CORPORATION—233 BROADWAY, NEW YORK 7, N. Y.—Broad Street House, London, E. C. 2, England.

on trend with known fault lines is to be expected. More fields will result as the extensions of the fault trend are defined. Success of formation fracturing in recent years has served as the stimulus for intensive exploration of these sands. Before the process was introduced a few years ago, these were mediocre reservoirs productionwise. But they can now be converted into economically promising pay horizons at moderate depths.

Acknowledgment

The author thanks Ohio Oil Co. for permission to publish this paper, Gilbert L. Brown for field data, and Anita Craig for assistance in drafting the figures.

EXPLORATION HIGHLIGHTS

MID-CONTINENT

OKLAHOMA

Year-End Wildcatting Promises Big '56 Play

Rocks of Cambro-Ordovician and Ordovician are the center of exploratory interest and drilling in Oklahoma this winter. The Arbuckle lime and the sands of the Simpson group will bring and are bringing important discovery news out of southern Oklahoma areas.

Cumberland area . . . The most recent discovery of note in southern Oklahoma is Pure Oil Co. 3 Stewart, NW SE NE 28-5s-7e, a field-well Arbuckle test at Cumberland.

The well was deepened to the Arbuckle at 6,775 ft. from the Oil Creek sand. The well flowed 4,050 M.c.f. of gas per day with a distillate spray reported.

Mr. Sam . . . The Arbuckle lime is fast gaining in importance as a big reservoir for southern Oklahoma.

Frankfort Oil Co. 10 Baldwin in NE NE SE 5-1s-1e, Murray County, flowed 1,000 bbl. of oil in 24 hours from open hole in the Arbuckle at 6,537-6,669 ft. This well confirmed Arbuckle production indicated in the Mr. Sam area several months ago at another deep Frankfort test. The 1 Baldwin in 4-1s-1e flowed 185 bbl. of oil from the Viola for a new pay discovery in the Mr. Sam area.

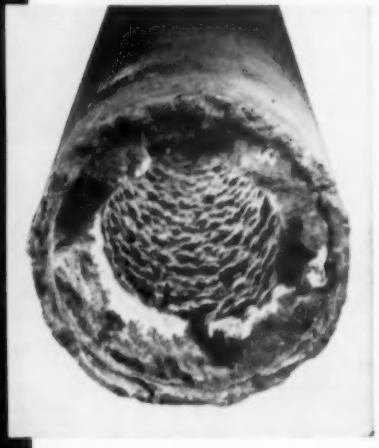
Down in the Greenville area Frankfort 1 Gardner, SW NE NW 34-6s-2e, flowed 156 bbl. of oil in 20 hours on a small choke from Joins open hole at 11,515 ft. This well is located at the southeast end of the trend of new fields south of Lone Grove, Brock, Healdton and thence to North Marietta.

Graham area . . . Gulf Oil Corp. will drill a deep Ordovician test in Carter County's 26-2s-3w area. The well is the 2 Smith in NE SW. Some Simpson oil has been found in this area in the past, but Hunton-Siluro-Devonian oil has been produced here since 1927.

Thirty-mile trend . . . This trend south of Brock and Lone Grove is still adding

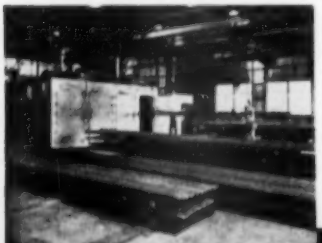
PARAFFIN your problem?

...Then Read This:



A Louisiana oil company had an uncoated string of 2" EUE tubing that plugged in three days. Tubing lined with TK-2 plastic was installed and is working perfectly, even after eight months.

A Texas company experienced heavy paraffin accumulation in flow lines and had to use hot oil circulation as frequently as twice weekly. Tube-Kote lined pipe was substituted and has been in service six years without trouble.



Tube-Kote plastic linings can solve your paraffin *and corrosion* problems, too. WRITE TODAY FOR ILLUSTRATED BROCHURE ON TK-2 PLASTIC LININGS.

TUBE-KOTE

▲ Some of the huge bake ovens where TK-2 plastic is bonded to pipe internal surface.

TUBE-KOTE, INC. - P. O. Box 20037 - Houston 25, Texas

Pioneers in plastics since 1939 . . . manufacturers-extruders of plastic pipe for the oil industry. Factory trained field engineers available for consultation in all principal oil areas.

Index to area reports

Mid-Continent	134
Basin and Range	136
Western Canada	136
Appalachian	136
Great Lakes	141
Eastern Interior	141
Pacific Coast	143
West Texas-New Mexico	145
Hugoton Embayment	145
Ark.-La.-Tex.	146
Rocky Mountains	148
Gulf Coast	148
Southwest Texas	152
Successful Wildcats	152

WOODWARD

GOVERNOR SERVICE

SUITS ALL FIELD CONDITIONS

We at the Woodward Governor Company have always been ready, willing and able to give users of our equipment competent, economical and, whenever necessary, very fast service, for routine governor overhauls or for emergencies that arise on rare occasions. When speed is important we have a fleet of airplanes and several competent pilots to transport governors or service men quickly.

BUT—a lot of users of our equipment don't seem to know about this. Here's the story:

Our experienced people, using the best and most expensive special tools, test stands, and other facilities in our plant can rebuild a governor in a minimum time. They install all the latest improvements, so the rebuilt governor often works better or lasts longer in service than when it was new.

In most real, but fortunately rare, emergencies, we can do the job in one day, though ordinary jobs require more time because our shop is very busy.

The cost, labor plus regular list price for parts, depends on how clean the governor has been kept, its age, engine roughness, and other factors.

Here are four ways to have your governor put in new condition, with a new governor guarantee on work done in our plant:

1. REPAIR AND RETURN

While your engine or turbine is shut down for other work, return the governor to our factory in Rockford, Illinois. No return tags needed, no formalities—just make sure your company name is on the crate. It helps too, if your purchase order lists the governor serial number. Some governors of which only one or a few were built can only be handled this way. In most cases the unit exchange plan below is better and the cost is the same.

2. UNIT EXCHANGE

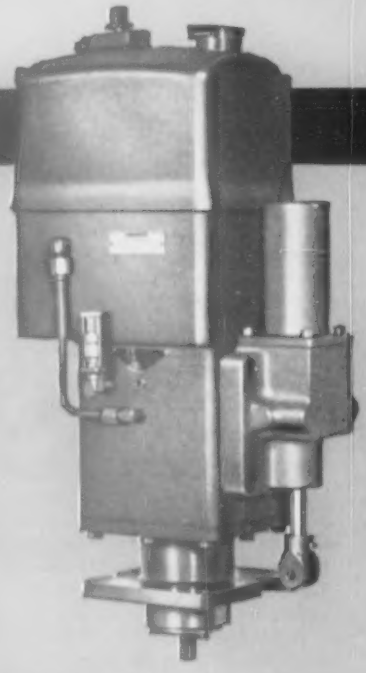
Send us a purchase order with the serial number of your governor, and tell us when you plan to shut down to install it. We'll ship a governor like yours but with all the latest improvements. It takes only a few minutes to remove the old one and install the replacement. Send the old governor back to us for overhaul, and we'll keep it in our stock ready for the next plant that needs it. Try to order early when possible, and we'll try always to give same day service IF there's a real emergency. The cost? Same time and material as above. You pay shipping costs.

3. OVERHAUL OR REPAIR IN YOUR PLANT

This is the most expensive and least satisfactory way to overhaul a governor, but if an emergency or special circumstances make it desirable, we'll send a man to your plant.

4. DO IT YOURSELF

Some competent mechanics repair their own governors in the field, though there usually isn't much saving in doing so. Give us the serial number of the governor and we'll send bulletins and suggest parts you may need. If you have a lot of governors, send your repair man to our plant for two to four days training. If you're having some little trouble, write us about it and maybe we can tell you the cause. HALF THE GOVERNOR TROUBLES AREN'T IN THE GOVERNOR—AND MOST OF THE OTHERS COME FROM DIRT. Washing the governor in spirits once a year and filling with clean oil helps prevent trouble. You can easily replace your own oil seals every few years.



CAN WE HELP? WANT INSTRUCTION BULLETINS?

Tell us the serial number of the governor (or typical governors) and what it's controlling (AC generating unit, boiler feed water pump turbine, cat-cracker air blower, etc.). We'll answer promptly.

WOODWARD GOVERNOR COMPANY

Rockford, Illinois

WOODWARD SERVICE

WORLD'S OLDEST AND LARGEST MANUFACTURER OF HYDRAULIC GOVERNORS FOR PRIME MOVERS

new pay wells at a fast clip. There are six known reservoirs in the region which were not tested as pay zones until Frankfort's discovery in the Lone Grove area earlier this year at 2 Williams, Carter County. New producing areas in the region have basal Pennsylvanian, Sycamore-Mississippian, Hunton - Siluro - Devonian, Viola and Bromide - Ordovician, and Arbuckle-Cambro-Ordovician.

KANSAS

Republic Sets Casing at Rush County Prospect

Casing is set for testing at a Cherokee sand oil discovery prospect 1½ miles northwest of Webs pool in Rush County. The discovery well is Republic Natural Gas Co. 1 Saehl, SW SW NE 8-19s-20w, 3½ miles south of Alexander, Kans.

Recovery was 240 ft. of oil-cut mud, 1,140 ft. oil on a drill-stem test of the Cherokee-Pennsylvanian at 4,236-51 ft.

New Discovery Announced For Kingman County Area

Southern Kingman County has a new pool discovery well at Wilcox Oil & Gas Co. 1 Gilchrist in SE NW NE 15-30s-7w, 1 mile northwest of West Reida pool.

Recovery on a Lansing-Kansas City drill-stem test at 3,730-40 ft. was 40 ft. heavily oil and gas-cut mud and 1,050 ft. gassy oil. A drill-stem test in the Mississippian at 4,085-98 ft. got 70 ft. gas-cut mud.

Bertholf . . . Pickrell Drilling Co. is testing at its 1 Bertholf in SE SE NE 3-30s-8w, about 2½ miles north of Spivey pool, also in Kingman County.

A test of the Mississippian at 4,182-4,205 ft. made 3,100 M.c.f. of gas per day and recovered 90 ft. gas-cut mud, 60 ft. oil and gas-cut mud, 60 ft. heavily oil and gas-cut mud, 45 ft. muddy oil and 15 ft. water.

BASIN AND RANGE

NEVADA

Herman L. Hurst, Oklahoma City independent operator, and Blalock Drilling Co., Oklahoma City, have moved in rotary tools 2 miles southeast of Battle Mountain, Nevada, for a 6,500-ft. wildcat.

Geological work in the wildcat venture has been done by Dr. A. Vorheis of Carlin, Nev., and Dr. George C. Atha, Los Angeles. Location is in C NE NW 34-32n-45e, Lander County. Drilling at this location follows closely the staking of Richfield Oil Corp.'s new Nevada wildcat in Elko County's Rabbit Creek area, 11-34n-57e. That well is a 6,000-ft. test.

WESTERN CANADA

ALBERTA

Success Reported at Goose Lake Wildcat

A well which has discovered oil in apparent commercial quantities, drilled by Richfield Oil Corp. in September, was reported last week. It lies in the Goose Lake area of Central Alberta, 18 miles southeast of Hardisty and 94 miles southeast of Edmonton.

Richfield 6-32 McLennan, LSD 6, 32-41-12w4, was drilled to a total depth of 3,230 ft. and found the oil flow in the Cameron sand which is just below basal Quartz, both Cretaceous in age. The pay sand was found at 2,950 ft. During five tests, indicating an oil zone of 50 ft., oil flowed to the surface on the last three. Production casing has been set and the well is perforated at 2,964-80 ft. Initial swabbing tests at the well flowed oil at the rate of 5.5 bbl. in 55 minutes and 55 bbl. in 4¾ hours. It is now standing, shut in, pending the outcome of a follow-up well ⅝ mile northwest.

Important Strike Made at North Heart River

One of the best discoveries of the year for Alberta is in the making at Union Oil Co. of California-Hudson's Bay Oil & Gas Co. 15-15 North Heart River.

This new discovery flowed light-gravity oil at an estimated rate of 480 bbl. per day during drill-stem test of an unidentified zone just above the granite. The well topped the Beaverhill Lake zone at 6,510 ft. and top of the granite at 6,878 ft. Location of the wildcat is on LSD 15, 15-80-16w5, 40 miles southeast of Peace River and 35 miles north of High Prairie.

APPALACHIAN

OHIO

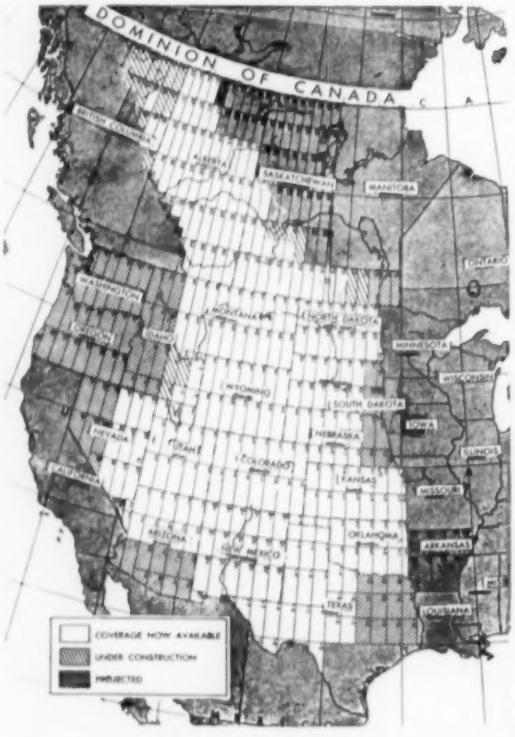
Another small pool was added to the many now producing in Killbuck Township, Holmes County. Oxford Oil 1 (10), Bartlett Anderson, Section 11, logged the Clinton at 3,186-3,216 ft. with a production of 40 bbl. and 200,000 cu.

CONTROLLED
Regional Maps

Over a MILLION square miles of *Controlled* Regional Base Maps now available. Can be purchased by contract on long-term basis. Four standard scales available for Land, Geological, Geophysical and Executive use. Call or Wire.

You're SURE of MAPS by

MULDROW
Aerial Surveys Corp.
212 North Colorado
Midland, Texas



Call your

BUTLER

Distributor for . . .

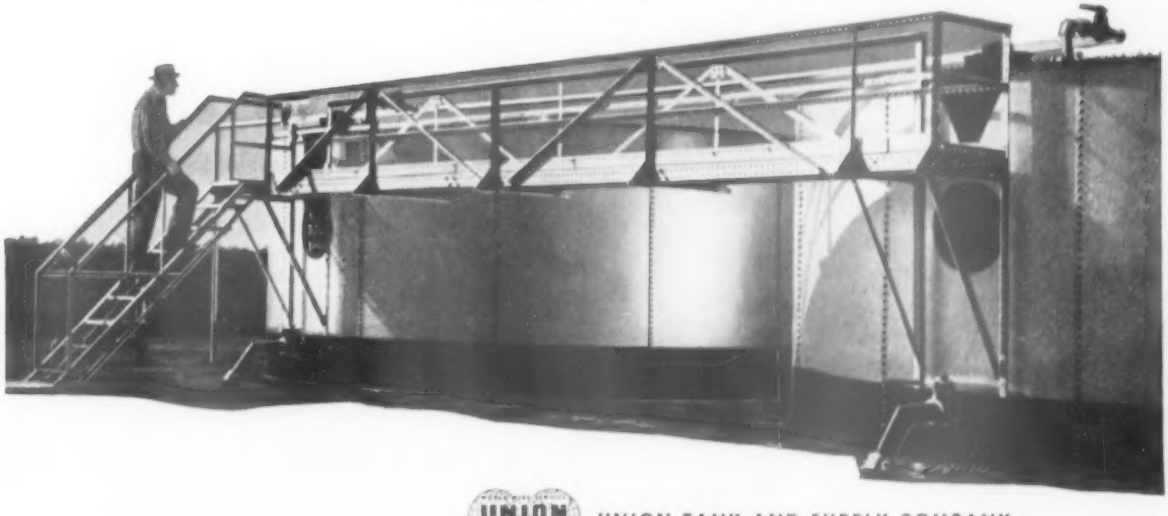
SAFE EASY

access to your bolted tanks with steel walkways and stairways

Complete your tank battery with easy-to-assemble Butler steel walkways and stairways and you'll be sure your personnel will work in safety, with greatest efficiency.

These firmly cross-braced walkways and stairways give years of service, require little maintenance, fit any A.P.I. bolted tank. Stair treads are roomy, and burr-punched for safety. Hand rails have rounded corners, easy to reach.

The next time you bring in a well, call your nearby Butler distributor.



UNION

UNION TANK AND SUPPLY COMPANY

Abilene, Texas	Nacona, Texas	Oklahoma City, Okla.	Denver, Colo.
Alice, Texas	Odessa, Texas	Tulsa, Okla.	Fort Morgan, Colo.
Beaumont, Texas	Hobbs, N. M.	Great Bend, Kan.	Sterling, Colo.
Dallas, Texas	Dubach, La.	Plainville, Kan.	Casper, Wyo.
Fort Worth, Texas	LaFayette, La.	Russell, Kan.	Newcastle, Wyo.
Houston, Texas	New Orleans, La.	Wichita, Kan.	Powell, Wyo.
Kilgore, Texas	Ardmore, Okla.	Kimball, Nebr.	Williston, N. D.
Midland, Texas	Cushing, Okla.	Sidney, Nebr.	Glendive, Mont.

AMERICAN PIPE AND SUPPLY COMPANY
Casper, Wyoming Denver, Colo. Cut Bank, Montana

HARRY G. MILLER
El Dorado, Arkansas

BUTLER STEEL PRODUCTS

BUTLER MANUFACTURING COMPANY
7464 East 13th St., Kansas City 26, Missouri

Manufacturers of Oil Equipment • Steel Buildings • Farm Equipment • Dry Cleaners Equipment • Special Products

Factories located at Kansas City, Mo. • Galesburg, Ill. • Richmond, Calif. • Birmingham, Ala. • Houston, Texas • Minneapolis, Minn.

CARBON STEEL

R-P&C Bar Stock Valves

• RATED FOR 10,000 PSI

• FOR CLOSE CONTROL, HIGH TEMPERATURES OR PRESSURES

These rugged bar stock valves were originally developed by R-P&C for close control or instrument use. However, their versatility has proven itself in so many different applications that they are now considered general purpose valves. They are particularly applicable for services involving throttling, or high temperatures and pressures, and are especially adapted for use in crowded applications such as panel boards.

Rated for 10,000 psi at 150°F., each carbon steel bar stock valve is individually tested at 15,000 psi before leaving the factory. They are supplied in sizes from ⅛ to 1", in globe and angle styles with female ends, male and female ends, or male union ends. They can be furnished in 12-14 chromium stainless steel and 18-8 molybdenum stainless steel for corrosive applications. May also be supplied with special stellite discs for extra abrasion resistance in extremely severe throttling services. Those other than carbon steel are rated at 4,000 psi at 150°F.

FREE WALL CHART

"How to Protect Your Valves"
17 x 22" wall chart gives installation and operation pointers. Tells how to protect valves, prolong life. Write for your copy.

R-P&C's complete selection of bar stock valves is only one element in a complete valve line which includes gate, globe, angle and check valves in a wide range of sizes and styles, in bronze, iron and cast and forged steel. ***See your R-P&C Distributor or write for catalog.***

ACCO

R-P&C Valve Division
AMERICAN CHAIN & CABLE

Reading, Pa., Atlanta, Boston, Chicago, Denver, Detroit, Houston, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

R-P&C valves

ft. of gas after fracture. In the western part of Knox Township, north of the gas area, David Shafer 1 (5) D. S. Ellasser, Section 15, gaged 50 bbl. and 500,000 cu. ft. after fracture gas from Clinton at 3,159-81 ft.

Flint Ridge pool had the two best producers for the week, both in Hopewell Township, Licking County. Clinton Oil 3 C. V. Roberts, Lot 12, gaged 250 bbl. after fracture from sand at 3,142-65 ft. and Mid East Oil 4 Charles Pharis, Section 9, gaged 400 bbl. after fracture from sand at 3,025-59 ft.

EASTERN KENTUCKY

In the Pike County sector of Big Sandy gas field, Kentucky West Virginia Gas Co. has completed 6263 Bowles and Ratliff. Situated on Morrowbone Creek, test gaged initially at the rate of 169,000 cu. ft. of gas daily from Devonian black shale 3,283 ft. to 4,035 ft., total depth. Well was shot with 7,320 lb. of gelatin and a rock pressure of 540 lb. in 60 hours.

Oliver Jenkins, et al have completed an important wildcat test located on Nineva Creek of South Fork of Rockcastle River in Laurel County. The test, No. 1 Fred Lucas gaged 488,000 cu. ft. of gas daily from the Everton and Knox formations at a total depth of 3,559 ft. A rock pressure of 800 psi. was recorded in 48 hours. Significant markers include: Devonian Brown Shale 1,225 ft., Silurian lime 1,440 ft., Ordovician 1,541 ft., Everton 3,222 ft., and Knox 3,282 ft.

WEST VIRGINIA

In Union district, Preston County, West Virginia, Cumberland & Allegheny Gas Co. 1-535 C. R. Lipscomb, wildcat, elevation 2,516 ft., gaged 2,524,000 cu. ft. of gas after Hydrofrac in the chert which was topped at 4,537 ft. The rock pressure was 960 psi. in 48 hours, total depth 4,628 ft.

Columbian Carbon Co. 1-1217 Theodore R. Rembold is still cleaning out in bad hole shot at 5,397-5,478 ft. The depth is 5,465 ft.

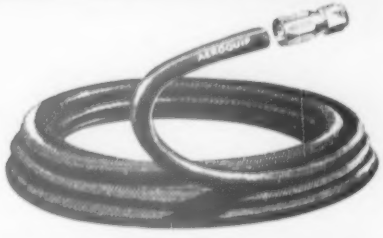
PENNSYLVANIA

Banks Township, Indiana County, Southwest Pennsylvania, Columbian Carbon Co. has resumed drilling in 1831 Farmers & Miners Trust Co., and is at a depth of 910 ft.

• In Young Township, Manufacturers Light & Heat Co. 4332 Stewart and R. & P. Coal Co. is at 342 ft.

• In Kiskiminetas Township, Armstrong County, Fred M. Schreckengost et al., completed 1 W. M. Schreckengost at 5,500 ft. and will market the gas from the Murrysville sand which

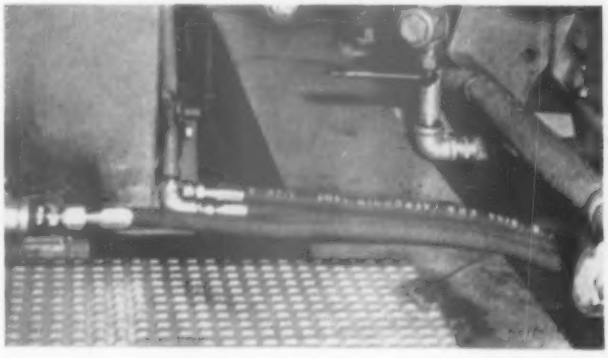
Aeroquip Flexible Hose Lines Add Dependability, Reduce Downtime



ON CARDWELL'S NEW S-350 AND J-450 DRILLING RIGS

The use of Aeroquip hose lines on Cardwell Manufacturing Company's newest drilling rigs offers two important advantages: (1) Aeroquip's rugged quality means longer, more dependable service; (2) Replacement lines can be made quickly, right on the job.

With Aeroquip you make hose lines for all makes and types of oil field equipment as you need them, from a small supply of bulk hose and reusable fittings. Inventory is reduced, downtime is minimized. See your Yellow Page Directory for your Aeroquip distributor, or write for Bulletin No. 153.



Aeroquip

REG. TRADEMARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

LOCAL REPRESENTATIVES IN PRINCIPAL CITIES IN U.S.A. AND ABROAD • AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

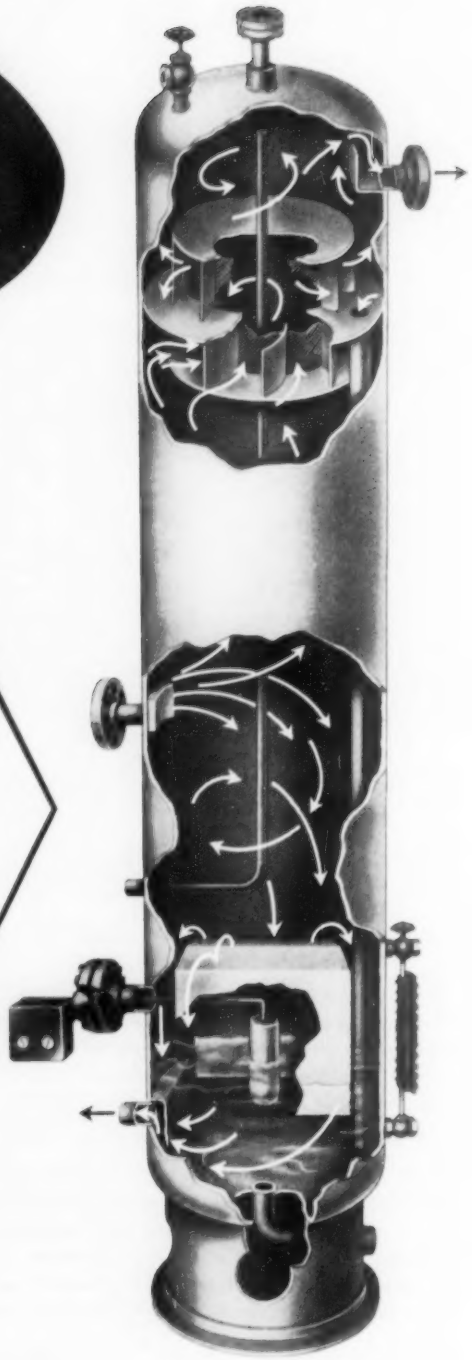
DRIER GAS.....

HIGHER OIL YIELD

Impingement, centrifugal force, gravity, surface tension, adhesion—all these forces are combined more efficiently in the Tyson Smith Co. TWO-STAGE MIST EXTRACTOR. That's the reason more and more of them are being installed throughout the oil fields of the Southwest.

- Two-Stage Mist Extractors
- More efficient separation of dry gas and oil
- Service by experienced personnel
- Proven control and safety devices
- Full range of capacities and working pressures
- Variety of capacities in each working range
- Two or more units give dependable stage-separation on multiple installations
- Tangential inlet

Specify TYSCO Vertical Separators on your next installation for quicker profits—and for greater profits in the long run.



Standard TYSCO Vertical Separator illustrated.

TYSCO

TYSON SMITH COMPANY

UNderwood 9-1425 P. O. Box 7398 Houston 8, Texas

was encountered at a depth of 1,487 ft., far short of its originally intended depth of over 12,000 ft.

GREAT LAKES

MICHIGAN

New basal Salina A-1 dolomite dry gas well discovery appeared almost assured at Panhandle Eastern Pipe Line Co. 1 Teltow, NE NE NW 22-4n-15e, Casco Township wildcat, St. Clair County.

Gas pay was cored in this basal Salina pinnacle reef 2,386-2,443 ft., present total depth. Wildcat threatened to blow out while coring was in progress, and did unload itself while 5-in. casing was being run and cemented in at 2,378 ft. Observers were rather definite in evaluating this wildcat as a "sure" gas discovery well on the basis of this early information. Gas pay had not been gaged.

Panhandle Eastern has been a pioneer developer of potential southeastern Michigan Salina-Niagaran reef areas. When the 1 Teltow is completed as a gas discovery, it will be second gas strike in this pay horizon for this township by Panhandle. The first, completed in mid-1952, was at the 1 Ringel, C SE, 31-4n-15e, was rated good for 14,600,000 cu. ft. of gas a day and is now tied into gas pipeline outlet.

It will also be the second basal Salina A-1 dolomite discovery well on Panhandle acreage in St. Clair County for the current year. Previous strike, a gassy oilwell completion, was at the Tucker, Comm. 1, SE SE SW 10-3n-16e, Cottrellville Township, which was rated good for 20 bbl. of oil a day from A-1 dolomite pay at 2,176-97 ft. Between a quarter and one-half million cubic feet of gas showed with oil at this strike.

Panhandle Eastern was unofficially reported to have in excess of 8,000 acres under lease in Casco Township, St. Clair County. Company, encouraged by results of geophysical and drilling program for this so-called pinnacle reef gas and oil production may accelerate both development and exploratory drilling in the area in 1956.

EASTERN INTERIOR

ILLINOIS

Three New Oil Pools in Illinois in November

Three oil pools were discoverd in Illinois in November, according to the State Geological Survey Division of the Department of Registration and Education. The new pools, are Tovey in Christian County, producing from the Silurian, Bartelso East in Clinton County, producing from the Devonian, and Oak Point West in Clark County, producing from the Aux Vases sandstone.

Six extensions to pools were discovered, including two to Fishhook (gas) in Pike County and one each to Toliver East in Clay County, Junction in Gallatin County, Dale Consolidated in Hamilton County, and Epworth Consolidated in White County.

Seven new pays were opened up. The Shawneetown pool in Gallatin County, which had been abandoned, was revived by a well producing from three sands—the Palestine, Waltersburg, and Tar Springs—all of them new for the pool. In the Louden pool the first Trenton production was reported. The other three new pays were the McClosky limestone in the Junction pool and the Cypress sandstone in the Toliver East and Harco East pools.

Drilling increased slightly in November. A total of 318 wells were completed, or an average of 80 per week, 4 more than in October. Of the November completions, 54 per cent were producers, as compared with 51 per cent in October.

The most interesting new development during November was the com-

competition *makes it better!*

SURE, COMPETITION makes it better for everybody especially the customer. Competition made America great. Competition makes oil well cementing service better, too. On your next cementing job, call in the company that is sparking the business with its new, dynamic approach to equipment and methods.

Engineered answers to oil well cementing

BJ SERVICE, INC.

A FULL MEASURE ... of SERVICE

This is especially true of all the eighteen Stores of Wilson Supply Company, located in Texas and Louisiana. Every Store is well stocked with a large diversified inventory, to serve the needs of the Oil Well Drilling and Producing Industry.

From your nearest Wilson Supply Store you can get the equipment and supplies of proven performance—and prices are always competitive. The Service will always be FULL measure.

"WHAT YOU WANT — WHEN YOU WANT IT"

MAIN OFFICE and WAREHOUSE [illegible] CONTI ST.

BRANCH STORES

TEXAS: Alice, Corpus Christi, Victoria, McAllen, Bay City, Columbus, Barbers Hill, Liberty, Beaumont, Kilgore, Sherman, Odessa. LOUISIANA: Lake Charles, New Iberia, Houma, Harvey, Shreveport.

SALES OFFICES

DALLAS — SHREVEPORT — SAN ANTONIO
TULSA — NEW ORLEANS — LAKE CHARLES
CORPUS CHRISTI — MIDLAND

WILSON SUPPLY CO
HOUSTON, TEXAS

pletion of five good wells in the Oak Point pool, Clark County, and the discovery of the Oak Point West pool. Oak Point had been abandoned and was revived only a few weeks ago. Seven wells were drilling in the area at the end of the month.

Completion was reported in November of a Cypress gas well in the Cooks Mills Consolidated pool with an initial open flow capacity of 24,000,000 cu. ft. of gas. This is one of the biggest gas wells ever completed in Illinois.

Production for November was estimated at 6,882,000 bbl., or about 229,000 bbl. per day.

PACIFIC COAST

CALIFORNIA

Set Casing in Saticoy Field Extension Test

Shell Oil Co. was cementing 7 in. casing at 8,615 ft. in 4 S.P.S., an easterly extension to its Saticoy field discovery well in Ventura County. A drill-stem test at 8,660-8,790 ft. recovered 870 ft. of slightly gassy mud with scum oil in 1 hour. Flowing pressures ranged between 2,340 and 2,500 psi. On another drill-stem test at 8,653-8,798 ft., the well had a strong steady blow for 1½ hours and then decreased to a medium blow for another 1½ hours. Gas to the surface time was 30 minutes on this test.

Production in the discovery well, 2 S.P.S., SE NW 29-3n-21w, is from sand and siltstone in the Pico formation of Pliocene age. Production at nearby fields is all from the nonmarine Sespe.

New Gas Field Discovery In Glenn County

Gene Reid Drilling Co. was running tubing preparatory to completing its 1 Capital Co. wildcat for a new gas field discovery in the Willows area of Glenn County. This well, which total depthed at 5,993 ft. is located NE NE 5-18n-2w. This is about midway between Beehive Bend field 6 miles to the north and Princeton field 5 miles southeast. On a test of the interval 5,933-85 ft. the well flowed 800 M.c.f. of natural gas through a 16/64-in. choke.

Humble Prepares Offset Site

Humble Oil & Refining Co. was preparing to drill a southerly extension test to the South Mountain field in Ventura County. The drill site will be located on a 600-acre lease Humble recently obtained in sections 29 and 30-3n-20w. The nearest production to Humble's new holdings is 300 ft. west of the lease. This is on the Santa Paula side of the range. Production in the field, which has been at the rate of 5,000,000 bbl. yearly, is associated with the Sespe formations. The structure is a faulted half dome located along the Oak Ridge fault.

Another Test Slated for Possible New Field

Reserve Oil & Gas Co. was moving in a rotary rig to try again to bring in a possible new field discovery 2 miles northwest of the Tejon field in Kern County. The first effort, C. F. Wehr 63-20 Butler-Wehr, was abandoned last August after promising shows failed to hold up. This early test, located NE SW 20-11n-19w, encountered encouraging oil sands but tests of the usually productive Olcese zone failed to produce in commercial quantities. Crude from the Valv and Pulv zones was also uncommercial because of excess water. This new test, 72-20 Butler-Wehr, is located about 1,000 ft. northeast of the abandoned 9,537 ft. 63-20 Butler-Wehr. It is scheduled to go to 7,600 ft.

Merry Christmas KELCO *Happy New Year*

BEN F. KELLEY CO., INC.

18 South Madison TULSA, OKLAHOMA Phone Gibson 7-1521

CALIFORNIA
Dorothy Laird, Long Beach
Howard Miller, Bakersfield

EAST TEXAS, NORTH LA., ARK. & NORTH MISSISSIPPI
M. L. Jackson, Shreveport

GULF COAST
Marc Lamkin, Bellaire
Mark Lamkin, Jr.
O. R. Hale, Houston

ILLINOIS
Harold R. Jarvis, Mt. Carmel

B. F. Kelley, *President*
W. L. Kelley, *Vice President*
B. F. Kelley, Jr., *Treasurer*
C. J. Parsons
Elizabeth Hull
Faye Beard
Allene Bush

KANSAS
C. M. Peterson, Great Bend

NORTH TEXAS
O. L. Franks, Wichita Falls

OKLAHOMA
R. D. Berry, Oklahoma City
Ray Cash
Allan Nelson

ROCKY MOUNTAINS, FARMINGTON AREA & WILLISTON BASIN
Carl D. Maulden, Casper
W. H. Sargeant, Farmington

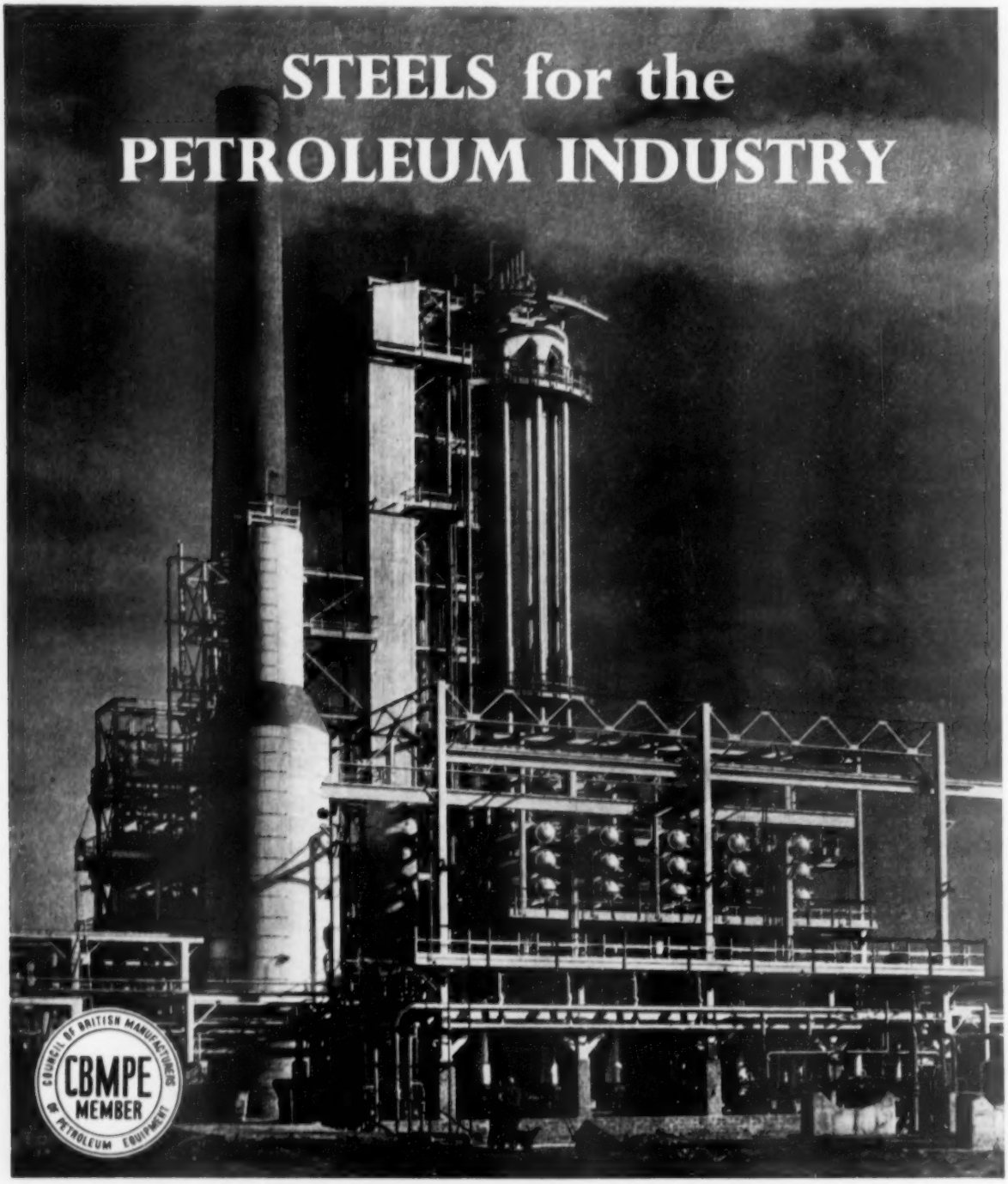
WEST TEXAS & EASTERN NEW MEXICO
Bill Campbell, Odessa
Arvel P. Smith

CANADA
G. H. Osborn, Edmonton

EXPORT REPRESENTATIVES
Val R. Wittich, New York
Clay H. Hesse
Fred J. Jobst

YOUR KELCO REPRESENTATIVE

THE UNITED STEEL COMPANIES LIMITED, SHEFFIELD, ENGLAND



"A Symphony in Steel"—an Anglo-Iranian photograph.

THE UNITED STEEL COMPANIES LIMITED, SHEFFIELD, ENGLAND

APPLEBY-FRODINGHAM STEEL COMPANY · SAMUEL FOX & COMPANY LIMITED · UNITED COKE & CHEMICALS COMPANY LIMITED
STEEL PEECH & TOZER · UNITED STEEL STRUCTURAL COMPANY LIMITED · WORKINGTON IRON & STEEL COMPANY
DISTINGTON ENGINEERING COMPANY LIMITED · OWEN & DYSON LIMITED · YORKSHIRE ENGINE COMPANY LIMITED

THE UNITED STEEL COMPANIES LTD

UE 106

WEST TEXAS-NEW MEXICO

WEST CENTRAL TEXAS

Nolan County Well Completed for 230 Bbl.

C. L. Norsworthy, Jr. and R. L. Foree 1 Compton has been completed at a Strawn reef discovery, and operators have requested the name of West Nena Lucia be given the area. Daily potential was 230 bbl. of 42° oil on 16/64-in. choke, from pay at 6,990-7,020 ft. Gas-oil ratio was 1,550:1 and flowing tubing pressure was 800 psi. A previous test on 19/64-in. choke flowed at the daily rate of 545 bbl.

Top of the reef pay was 6,930 ft., on elevation of 2,438 ft. The well was drilled to the Ellenburger which tested mud with no shows at 7,318-40 ft.

Third Cambrian well . . . as well as a west extension to the Dora, Northwest (Cambrian) field in eastern Nolan County has been assured. Skelly Oil Co. 3-C Boyd, in 57-20-T&P Survey, flowed 24 bbl. of new oil in 3 hours after perforating and acidizing between 6,368-6,434 ft.

Skelly 1-E Boyd had discovery oil in the Strawn in the EVB (Ellenburger and Palo Pinto) field 5 miles northwest of the town of Nolan. On a 3-hour test in Strawn at 5,641-91 ft. the well flowed 87 bbl. of oil to tanks in 2 hours and 25 minutes, then reversed out an estimated 30 bbl. of oil. Top of the Strawn was 5,650 ft.

Stonewall Discovery Completed on the Pump

Fletcher Oil & Gas Drilling Corp. 1 Carothers has opened Bend conglomerate production 3 miles northeast of Old Glory Townsite, and 3 miles south of East Old Glory field.

The well was perforated and fractured at 5,931-60 ft., then pumped 154 bbl. of 37° oil in 24 hours. Location is in Section 13, BBB&C Survey, A-41. East Old Glory field produces from the same pay but the two areas are separated by a dry hole.

Trice Production Co. has established offset production in the new Clark-Tannehill pool 2 miles southeast of Pastura, in Stonewall County.

The 1 Swenson, east offset to 1 Carter discovery, flowed 8 bbl. of oil an hour from sand pay at 2,593-98 and 2,608-24 ft. Flowing pressures were not reported, but ranged from 225-525 psi. on a previous drill-stem test.

C. L. Norsworthy, Jr. and R. L. Foree 1 Compton has opened a new pool, or has extended Strawn production 2 miles west of Nena Lucia field in Nolan County. Venamadre field, to the northeast of the discovery, also produces from Strawn reef.

HUGOTON EMBAYMENT

TEXAS PANHANDLE

Northwestern Ochiltree Discovery Completed

A confirmation discovery to a recent Morrow gas strike in northwestern Ochiltree County has been completed and flowed 2,877 M.c.f. of gas per day plus 12 bbl. of distillate. The confirmation hit is Magnolia Petroleum

"an outstanding contribution to the art of oil property evaluation"—

OIL PROPERTY VALUATION

by PAUL PAINE, a consulting engineer with many years' experience in the oil production business

— because it covers such subjects as:

Oil properties and oil property interests . . . with definitions, examples, lists of required data, and a useful table giving the products of customary fractions used in dividing oil-property interests.

Unproved lands . . . including measures of value, the lease, selection rights, royalty, etc.

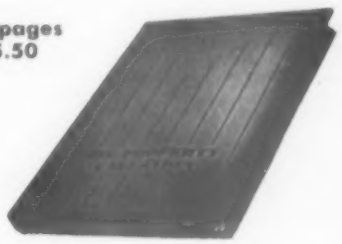
Oil and gas reserves . . . with definitions of terms, descriptions of methods . . . and all the working details.

Elements in valuation . . . including marketing the gas; costs for acquisition, development, operations, taxes and overhead; and many other topics.

Valuation methods . . . explains the classic "engineering method" in detail with excellent examples of data compilations; describes other methods based on the time to pay out, the average daily barrels of oil production, the well itself, and the barrels in the ground; remarks on valuation compiled for the lender of money, on royalties, and on fair market value.

The examination and report . . . gives practical directions on how to go about a job, the examination of accounts, and the preparation of a report.

204 pages
$5.50



For sale by

READER SERVICE DEPARTMENT
THE OIL AND GAS JOURNAL
BOX 1260 • TULSA 1, OKLA.

What's it take to Sell

A Truck Body?

"WITH ME IT'S STRICTLY PRICE!" . . . then Leland's Packaged Unit is definitely for you! The gin pole design coupled with a heavy duty behind-the-cab winch (furnished at your option) plus many other exclusive features make the Packaged Unit adaptable to a multitude of different trucking jobs. You cut expenses by eliminating unnecessary equipment.

"IT'S GOT TO LAST, BROTHER!" . . . that's true of you and a lot of others, friend. Trucks take a rough beating and that's why Leland has used sturdy materials and reinforced design throughout. The Packaged Unit is streamlined with flush-mounted gin pole pocket settings, recessed snatch block toggle, and flush-mounted body deck plate. The simplicity of design eliminates breakdown even under the most rugged use.

"I'VE GOT TO HAVE SAFETY!" . . . yes, that's right — there are a lot of green hands working today's equipment. Though they mean well they often make costly safety mistakes. But you can stop worrying. Special design features of the Packaged Unit such as the manual locking devices in the tailboard and the heavy duty drill pipe headache rack drastically reduces the chances for a serious accident.

AND YOU'LL FIND THIS SAME QUALITY DESIGN AND FABRICATION IN LELAND'S POLE TRAILERS . . . SINGLE AND TANDEM AXLE SELF-LOADING FLOATS . . . FIFTH WHEEL BODIES . . . DUMP BODIES . . . SERVICE BODIES . . . PLATFORM BODIES . . . LOW BED TRAILERS.

Leland

EQUIPMENT COMPANY

Oklahoma City • TULSA • Longview, Texas

Co.'s I George-Mount Unit, Section 55, Block 11, W. Ahrenback Survey. It is ½ mile northeast of R. H. Fulton 1-54 Share, a shut in Morrow gas well.

SOUTHWEST KANSAS

New Pays Tested in Greenwood Field Area

Panhandle Eastern Pipeline Co. is waiting for potential test at a big gas well in southern Morton County. The 1-27 Riley, C SE 27-34s-43w, Greenwood field well, flowed 13,700 M.c.f. of gas per day on a test of the Keyes sand at 4,541-42 ft.; it flowed 38,700 M.c.f. at 4,524-41 ft.; 44,450 M.c.f. at 4,515-25 ft.; and 51,000 M.c.f. per day at 4,506-12 ft. The well also found oil in the Mississippian.

ARK-LA-TEX

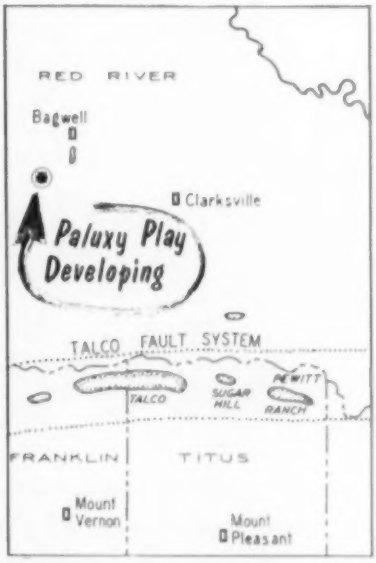
EAST TEXAS

Discovery Opens Paluxy Field in Red River County

I & L Development Co., Dallas, has completed its northern Red River County wildcat as a small Paluxy discovery, and the area has taken on all the aspects of a small boom.

The new producer was 1 E. E. Morris, John Guest Survey, which pumped 116 bbl. of 33° oil a day on completion. Pay was open hole in the Paluxy from 2,049-54½ ft., total depth. At present there is no outlet for the new pool.

Eugene Talbert 1 Joe Antone will be



Three new tests have been scheduled for the new Paluxy area 4 miles southwest of Bagwell in Red River County.

TWICE AS MUCH FLUID OPENING

with the GUIBERSON FUL-FLO SQUARE KELLY

Guiberson's Ful-Flo Square Kelly gives you *more than twice* the fluid opening of conventional bored forged kellys. This means more volume circulated with less pump pressure. Kelly is designed to work smoothly with Guiberson Drilling Heads as well as in conventional rotaries. Ful-Flo kelly is ideal for drilling, reverse circulation and clean-out jobs.

MORE ADVANTAGES

- Feeds easily through kelly bushing because of smooth straight sides.
- Won't whip because it's perfectly balanced.
- Less wear—passes easily through the packing rubber.
- Gives maximum flow—smooth liner tube walls with no offsets or restrictions. (Take a look through one!)
- Greater stability and perfect balance reduce wear on related drilling equipment.

Built like a truss, the Ful-Flo Square Kelly is *extremely strong*, but with *less weight*. Square, seamless outside tubing is welded securely to seamless liner tube. Every kelly is tested at 3,000 PSI.

Better Be Safe Than Sorry!

THE

GUIBERSON

CORPORATION

ESTABLISHED 1919 • DALLAS, TEXAS, U. S. A.

Sold By Leading Oil Field Supply Stores Everywhere

drilled approximately 1½ miles to the southwest of the discovery, on a 200-acre lease in the John Guest Survey, A-365. Projected depth was 2,200 ft.

D. W. Shelton 1 A. F. Swint, will be a 2,600-ft. test 2 miles north of Deport, in the Bramlett & Ryan Survey.

J. S. Batson 1 Fred Fisher, 1 mile north of I & L Development 1 Morris, was reported to have encountered water around 2,000 ft. Original announcement on this test called for drilling to 3,500 ft.

I & L Development 1-A Morris, east offset to the discovery, also reported water on tests at 2,046-64 ft.

Gregg County re-drill . . . F. R. Jackson and S. H. Killingsworth have announced plans to re-enter and test the Pettit and Travis Peak formations in an old dry hole northwest of Judson in northern Gregg County.

ROCKY MOUNTAIN

MONTANA

Rank Strike Hinted In Carter County

A remote Ohio Oil Co. wildcat, the 1 Government, C Lot 6, 4-1s-62e, Carter County, is drilling below 8,700 ft. after recovery 4,300 ft. of black oil on a test of the Red River-Ordovician at 8,602-20 ft.

This important prospect is located 22 miles west of South Dakota production at Buffalo field and is 19 miles south of Little Beaver field of Fallon County. The discovery appears to be in the very southwest corner of the Williston basin, possibly in the Sheep Mountain syncline.

NEBRASKA

Cheyenne County Discovery, Confirmation Completed

Ohio Oil Co. has completed 1 Spearow, S½ NE NE 23-15n-49w, Cheyenne County, for a pump gage of 126 bbl. of oil daily. The confirmation, 2 Spearow, W½ W½ NW 23-15n-49w, pumped at the rate of 237 bbl. per day at completion. The new field is 1½ miles northwest of production at Preble field.

COLORADO

Oil Flow Reported at Weld County Wildcat

Halbert, Jennings & Simic - Don Rounds Drilling Co. 1 Chapel, C NE NE 17-9n-56w, flowed an estimated 15 bbl. of oil hourly from "D" sand perforations at 5,768-74 ft. Gas recovery from the "J" sand was an estimated 5,000 M.c.f. per day.

The new discovery area is 2 miles north of Stoneham field. The confirmation well, 1 Nix, C SW SW 9-9n-56w, is drilling below 5,781 ft.

GULF COAST

SOUTH LOUISIANA

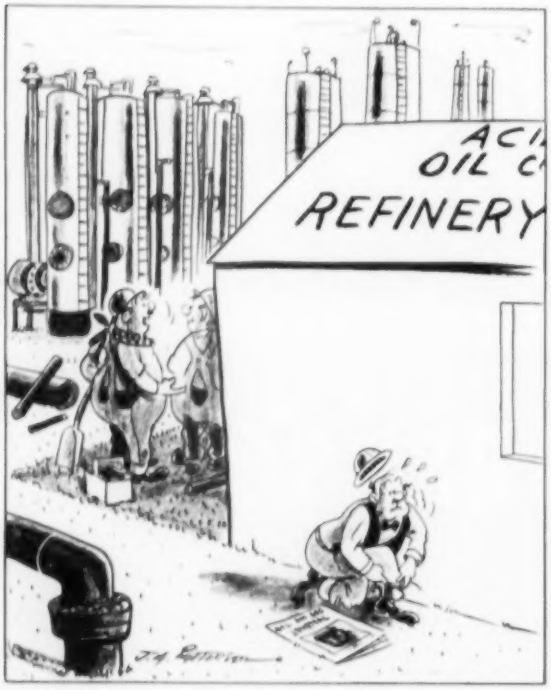
South Bosco Field Looms As Prolific Oil Discovery

The new South Bosco field on the Acadia-Lafayette parish line is beginning to loom as one of South Louisiana's more important "on-shore" discoveries of the year.

California Co. last week completed its third well in the field with a flow rate, on pre-potential tests through ⅛-in. choke, of 519 bbl. of 42.8°-gravity oil per day. Flow was under pressure or 5,250 psi., and had an unusually low gas-oil ratio of 271 cu. ft. per bbl. It showed no water.

The well, 2 Lafayette Parish School Board, confirms the oil discovery made

THE OIL AND GAS JOURNAL



"Th' boss hasn't been himself lately—have you noticed the improvement?"

Drilling & Service

ULTRA FINE DIAMOND EQUIPMENT FOR THE OIL FIELD

in the company's second well (1 School Board), 1,300 ft. west, which had an oil flow of 566 bbl. per day through 9/64-in. choke with the same pressure and gas-oil ratio of 773 cu. ft. per bbl.

Both wells produce from a 12,100-ft. sand, the new well being perforated at 12,084-12,104 ft., and the first at 12,114-26 ft. Both are on the Lafayette Parish side, a little more than ½ mile south and southwest, respectively, from the field's discovery well, across the line in Acadia Parish.

The latter well, completed last March, was a prolific condensate producer from a sand perforated at 13,244-53½ ft. It was rated good for 270 bbl. of 47°-gravity condensate with a flow of 2,060,000 cu. ft. of gas per day, gaged through 11/64-in. choke.

Oil Production Proved in Outside Island Gas Field

Outside Island field, 12 miles southwest of Kaplan, in Vermilion Parish, where two gas-condensate wells have been completed, has been proved productive of oil.

The oil discovery is by Texas Crude Oil Co. at its 1 Miller, northeast offset to the field discovery well, which flowed at the rate of 250 bbl. of 38.8°-gravity oil per day from perforations at 11,522-26 ft. Gas-oil ratio was only 823 cu. ft. per bbl. Flowing pressure was 2,000 psi.

The field's discovery well, drilled by Hassie Hunt, and completed in March 1949, is productive of gas and 42.7°-gravity condensate from sand perforated at 12,098-12,106 ft.

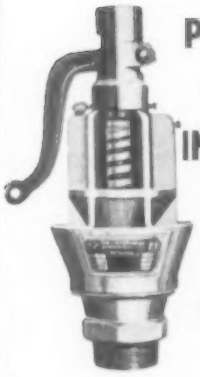
The field's second well, drilled by Magnolia Petroleum Co., and completed in November 1953, ½ mile south of the Hunt well. It was productive from perforations at 11,498-11,505 ft. Production in the new well may be from the same sand but with pay slightly down-structure in the oil column.

New Terrebonne Discovery Starts Development Play

Robert W. O'Meara's new oil discovery 3 miles southeast of production in the prolific Caillou Island field, in Terrebonne Parish, at the mouth of Terrebonne Bay, is stirring up a new flurry of deep-drilling activity.

The discovery well, 1 Louisiana Land & Exploration Co., on Timbalier Island, flowed more than 200 bbl. of oil per day through 7/64-in. choke while testing perforated interval at 10,758½-64½ ft., in a reported 70-ft. sand section.

Flow was with 200,000 cu. ft. of gas



PROVED BEST INFERNO Steam "Pop" Valves

Rigid tests under all sorts of field conditions prove conclusively that the INFERNO "Pop" Safety Valves are more dependable and safer. Tough malleable iron bodies—stems are stainless steel. Valves and seats of nickel alloy or bronze. Write for new Bulletin No. 32.

THE INFERNO CO.
Box 1138A
115 RICOU St.
SHREVEPORT, LA.
INFERNO

An OIL BANK . . .
directed by
OIL MEN . . .
in the
OIL CAPITAL
of the World!

Think 1st of Tulsa
OUR 60th YEAR
FIRST NATIONAL BANK & TRUST CO.
Member Federal Deposit Ins. Corp

INCREASE PRODUCTION

CLEAN OUT CHOKING SAND

Excessive sand and sediment holds back your oil. For fast, easy clean out with fewer round trips and less down-time, use world famous Miller Sand Pumps.

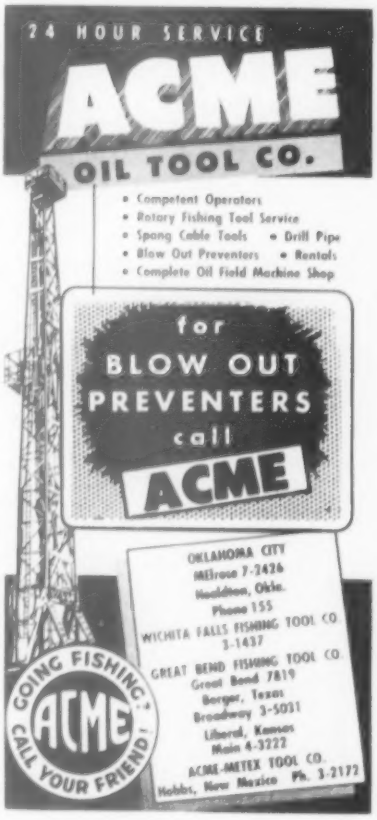
Write for descriptive price list.

SAND PUMP SIZES IN STOCK
O.D.—2½, 3, 3½, 4¼, 5, 5½, 7 In.
Lengths—20, 25, 30 ft.

Composite Catalog Page 3433

MILLER SAND PUMPS

MILLER SAND PUMP CO.
General Offices, Box 4516
Oklahoma City 9, Okla.
EXPORT OFFICES
30 Rockefeller Plaza
NEW YORK 20, N. Y.



When it's time to close a blowout preventer you have to be sure that the unions on the operating lines will hold — and continue to hold — the pressure required to keep preventer closed tightly around drill pipe.

And that's when **WECO** Union's "sealing and service you can trust" has real meaning. For **WECO's** famous ball and cone seat is built to withstand high pressures, shock, surge and vibration — and hold like a vise — without leaking.

Whether it's for jobs like a blowout preventer hook-up or for service like production headers — you'll find **WECO** *is the union you can always trust for sealing and service.*

1-12-55

WELL EQUIPMENT MFG. CORP.
HOUSTON, TEXAS

WECO

Division of CHIKSAN COMPANY *a subsidiary of* FOOD MACHINERY AND CHEMICAL CORPORATION

under pressure of 2,250 psi. Hole had been drilled to 11,038 ft.

Locations already have been made for six more wells in the immediate area, all in the same section, 4-24s-20e. Five of these will be drilled by O'Meara, and one by The Texas Co.

New Publication Records Southwest Louisiana Fields

A complete history of oil and gas development in 16 parishes of southwestern Louisiana is presented in a newly completed publication by Five Star Oil Report, Inc., Houston, Box 331.

Parishes covered include Cameron, Calcasieu, Jefferson Davis, Acadia, Vermilion, Lafayette, St. Martin, Iberia, St. Mary, St. Landry, Evangeline, Allen, Beauregard, Vernon, Rapides, and Avoyelles.

The publication lists structural information, producing horizons, discovery data, deepest tests, number of producing wells, principal leaseholders, cumulative production, and pipe line maps of all fields, both on and off shore. It is illustrated with parish maps, land plats, structure maps, cross sections, and electric logs.

Similar coverage has been given previously of Texas Gulf Coast and Southwest Texas counties. Coverage of southeastern Louisiana fields will follow.

TEXAS GULF COAST

Third Springer Field Well Gets First Oil Production

Sinclair Oil & Gas Co.'s third well in its new Springer field, 6 miles southwest of Conroe, in Montgomery County, has been completed as an oil producer, the first for the field. Its other two wells were productive of gas and condensate.

The new well, 3 Texas A. & M. College, has a potential flow rate of 73.5 bbl. of 41.4° -gravity oil per day through 5/32-in. choke. Its flowing pressure is 1,150 psi. with gas-oil ratio of 5,800 cu. ft. per bbl. Its pay is perforated at 5,626-28 ft. in hole drilled to 6,195 ft.

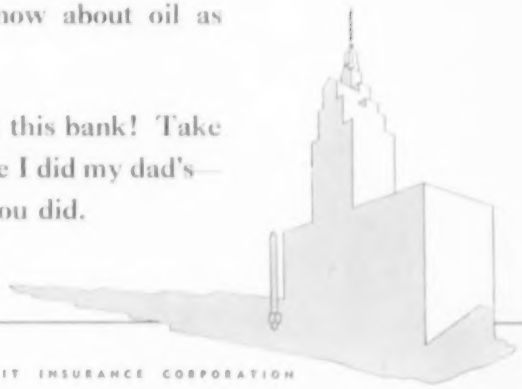
Location is 3,251 ft. northwest of the field's discovery well, 1 Texas A. & M. College, completed last April with gas-condensate production from perforated pay at 5,454-60 ft. Sinclair's second well, also productive of gas and condensate from the same pay, perforated at 5,450-54 ft., is 4,662 ft. northwest of the discovery well, on the same lease.

A dry hole, located ⅔ mile east of Sinclair's discovery well, has been drilled by Bassett S. Winmill.

I always go to the NATIONAL BANK OF TULSA

WHENEVER you need any type of oil financing it sure means a lot to do business with men who know about oil as well as banking.

That's what you find at this bank! Take my word for it—just like I did my dad's—you'll always be glad you did.



MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

NATIONAL BANK OF TULSA

The Oil Bank of America

Old "Dry" Hole Becomes Discovery Gas Producer

An old abandoned hole located southwest of production of West Ranch field in southwestern Jackson County has been converted to a large gas-condensate discovery well following a rework job by Paul R. Turnbull and associates.

The hole, drilled in 1951 by Union Oil Co. of California to 9,402 ft., was cleaned out by present operators to 6,135 ft., and with casing run to that depth, was perforated at 6,130-35 ft., opposite a Frio sand.

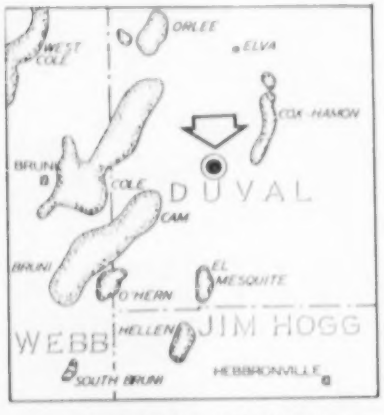
Open-flow potential rating of the well is 85,000,000 cu. ft. of gas per day with gas-condensate ratio of 460,000 cu. ft. per barrel. Shut-in pressure is 2,367 psi. Condensate gravity is 70°.

Numbering of the well was changed by present operators from 1 Bennett to 2 Bennett. Location is 7 miles south of LaSalle.

SOUTHWEST TEXAS

New Duval Oil Discovery Opens "Thanksgiving" Field

A new oil-producing area is being opened by Killam & Hurd in southwestern Duval County. The discovery well, 1 Juan Benavides, flowed more than 95 bbl. of 41.8°-gravity oil per day through a P-34 choke with pressure of 400 psi. and gas-oil ratio of 50 cu. ft. per barrel. Pay zone is perforated at 3,289-93 ft. with bottom of the hole at 3,295 ft. Location, in Share 5, El Mesquite and Carpenter Subdivision, El Mesquite grant, is 5 miles east of Bruni, and about midway between Cam and Cox & Hamon fields. Operators have asked the name "Thanksgiving" for their discovery.



Arrow points to Killam & Hurd oil-discovery well in southwestern Duval County.

Successful Wildcats

ALBERTA

Canadian-Export Gas 6-13 Hilda, LSD 6, 13-18-2w4. Medicine Hat gas well. TD 3,084 ft.

Mobil-Woodley-Stouthern 32-10 Grassdale, LSD 10, 32-6-15w2. Mission Canyon oil well. TD 5,235 ft.

COLORADO

Washington County, Pleasant Valley: Kimbark Co., Ltd., and Sterling Drilling Co. 1 Goodman, C SE SW 34-3n-53w. IPP 100 BOPD, "J" sand discovery, new field. TD 4,997 ft. "J" sand.

SOUTH LOUISIANA

Allen Parish: Sam J. Recile 1 Gray, 5-6s-5w. IP 84 BCPD and 442 M.c.f. daily, ⅛-in., 51.8°, perforations 7,715-17 ft. TD 9,399 ft. (New pay in Harmony field—southwest offset The Texas Co.'s discovery well).

Lafourche Parish: Stanolind Oil & Gas Co. 1 Nicklos et al, 21-15s-16e IP 80 BCPD and 2,656 M.c.f. daily, 3/16-in., 48.°, perforations 12,190-12,212 ft. TD 14,448 ft. (New pay in Thibodaux field).

Stanolind Oil & Gas Co. 1-B Levert, 78-14s-16e. IP 68 BCPD and 3,446 M.c.f. daily, 3/16-in., 49°, perforations 11,582-92 ft. (New pay in North Thibodaux field).

Vermilion Parish: Columbia Carbon Co. 1 Houssiere, 33-11s-2w. IP 1,640 M.c.f. daily and 25 BCPD, adjustable choke, 52°, perforations 9,538-44 ft. and 9,554-62 ft. TD 11,332 ft. (New pay in West Gueydan field).

NEBRASKA

Kimball County, Ansel-State: Tom Palmer, Inc. 1-F State, SE NW SE 16-12n-56w. IPP 245 BOPD, "J" sand discovery, new field. TD 6,604 ft. "J" sand.

NORTH DAKOTA

McKenzie County: Amerada Petroleum Corp. 1 Grimestad, C SE SE 19-152n-95w. IPF 244 BOPD, Madison discovery, new field. TD 9,291 ft. Madison.

OKLAHOMA

Grady County: A. A. Cameron 1 Crawford, ⅝ mile southeast of unnamed field in SW SE SE 31-3n-8w. IPF 14 BDPD, McKinney sand 5,594-5,635 ft., 1,520 M.c.f. of gas per day from McKinney, various chokes, 56°; 186 BOPD, Coline sand 6,666-6,751 ft., 4,574 M.c.f. of gas per day, 18/64-in. choke, 34°. TD 7,972 ft. (Dual oil and gas-distillate discovery).

Murray County: Frankfort Oil Co. 1 Baldwin, SE NW NE 4-1s-1e. IPF 266 BOPD, Viola lime 10,964-11,251 ft., 36.3°, ½-in. choke. TD 11,251 ft. (New pay discovery in Mr. Sam Arbuckle lime field).

SOUTHWEST TEXAS

Jim Wells County: Southwest Workover and Gust Tsesmelis et al 1 Young, La Tinaja de Lara Grant, A-36. IPP 15 BOPD (net), 40 per cent water, 38.6°, perforations 4,494-4,500 ft. TD 5,374 ft. (New field 3½ miles northwest of Alice).

San Patricio County: Plymouth Oil Co. 9-F Welder, Welder Ranch Subd., Section 40. IP 12,000 M.c.f. daily, open-flow potential, dry gas, perforations 3,139-43 ft. TD 5,772 ft. (New pay and west extension Rooke field).

Republic Natural Gas Co. and Forest Oil Corp. 1 Stark, George H. Paul Subd., Section 92. IP 7,100 M.c.f. daily, 13/64-in., GLR 19 M.c.f. per bbl., 52 perforations 9,431-33 ft. TD 9,942 ft. (New field—Stark).

Webb County: The Texas Co. 1 A. M. Bruni Est.—NCT-1, Jose Vasquez Borrego Grant. IP 6,820 M.c.f., open-flow potential, 6.43 BC per M.M.c.f., 50.4°, perforations 6,040-60 ft. Wilcox. TD 7,515 ft. (New field).

WEST TEXAS

Ector County: J. P. Wagner Exploration and J. M. Huber Corp. 1 Moss, 44-44-T2S-T&P, 14 mi. W Odessa. IP 144 BOPD, 28/64-in., 34°, TP 90 psi., pay 3,760-4,024 ft. TD 4,024 ft.

Kent County: General Crude Oil Co. 24-1 O'Keefe, 24-I-H&GN, 5 mi. SW Girard. IPP 80 BOPD, 39°, GOR 459, Pennsylvanian 6,594-6,600 ft. TD 6,605 ft.

Tom Green County: Sunray Mid-Continent et al 2 Rust, Sec. 269, Dist. 11, SPRR, 4 mi. SW Christoval. IP calculated open flow 4,000 M.c.f. gas. TD 4,658 ft.

EAST EXAS

Red River County: I & L Development Co. 1 Morris, John Guest Sur., 4 mi. SW Bagwell. IPP 116 BOPD, 33°, Paluxy 2,049 ft. TD 2,054 ft.

TEXAS GULF COAST

Chambers County: Kilroy Oil Co. of Texas, Inc., and F. A. Callery, Inc., 1 Manson K. Smith Unit 1, Anson Taylor Sur., A-241. IP 16,000 M.c.f. daily, open-flow potential, GLR 16 M.c.f. per bbl., 55.8°, perforations 9,032-42 ft. TD 9,208 ft. (New field.)

DeWitt County: Jake L. Hamon 1 Talk, Antonio Lazo Sur., A-653. IP 6,600 M.c.f. daily, open-flow potential, 18.82 BC per M.M.c.f., 57.07°, perforations 7,556-85 ft. (Luling sand). TD 7,648 ft. (New field.)

Galveston County: Superior Oil Co. 1 Evans Unit, I&GN Sur., A-619. IP 101 BOPD, 3/32-in., 28.4°, perforations 10,384-88 ft., and (dual completion) 100.5 BOPD, 5/32-in., 26°, perforations 8,445-48 ft. TD 10,437 ft. (New pays in Algoa field.)

Harris County: J. S. Michael 1 Hirsch et al, Gilbert Brooks Sur., A-6 (3 miles northwest of Huffman). Gas well, no gage. TD 8,588 ft. (New field.)

Magnolia Petroleum Co. 1 Shamrock-Hilton, J. Walters Sur., A-874. IP 187.97 BOPD, ⅜-in., 34.7°, GOR 538 cu. ft. per bbl., perforations 7,216-28 ft. (Vicksburg). TD 10,131 ft. (New pay in Pierce Junction field.)

TEXAS PANHANDLE

Hansford County: R. H. Fulton 1 Jones 144, C SW NE Blk. 45, Sec. 144, H&TC Sur. IPP 329 BOPD, ½-in. tubing choke, 40.1°, Morrow sand 6,987-7,002 ft. TD 7,503 ft. (Oil discovery).

Ochiltree County: Union Oil Co. of California 1 Russell Gas Unit, Sec. 1, C. Ximinies Sur. IPP 183 BOPD, Morrow sand 7,954-62 ft., 38°. TD 8,720 ft. (Oil discovery).

WEST VIRGINIA

Preston County, Union district: Cumberland & Allegheny Gas Co. 1-535 C. R. Lipscomb, elevation 2,516 ft., 2,524,000 cu. ft. gas, chert, 4,537 ft. TD 4,628 ft.

We send you best wishes
for a Happy Holiday Season
from our Houston Headquarters.

SCHLUMBERGER
Well Surveying Corporation
THE EYES OF THE OIL INDUSTRY

To everyone . . . the
Merriest Christmas ever!
THE CONTINENTAL
SUPPLY COMPANY

Law follows a tradition . . .

. . . Five Generations in Oil

A FAMILY tradition as old as the American oil industry is being carried on by Ted N. Law, president and founder of Falcon Seaboard Drilling Co.

It was just 20 years ago that Law organized the Tulsa contract drilling and producing firm with $50,000 and two rotary rigs—one on the Gulf Coast and the other at Monument, N. M.

His success in the years since perpetuated a family habit begun by Law's great grandfather, William Barnsdall. He drilled the second oil well in the United States.

William Barnsdall brought his producer in right on the heels of Col. Edwin Drake's 1859 discovery. He built the United States' first refinery near Oil City, Pa.

The holdings subsequently acquired by Barnsdall, his son Theodore, and Theodore's son-in-law, Robert Law, were consolidated into Barnsdall Oil Co. The firm was acquired by Sunray Oil Corp. (now Sunray Mid-Continent Oil Co.) in 1950.

Stock broker to oil man . . . Ted Law broke the family tradition temporarily.

He did not follow his father, Robert, into oil immediately, but entered the stock brokerage business in San Francisco in 1929. The 18-year-old youth bypassed college in favor of earning a living for his new bride.

He was associated with various brokerage houses in New York in the next 4 years. But this career was cut short by the death in 1933 of his father, then chairman of the board of Barnsdall.

"Our family's principal interests were in oil," Law recalls, "and I was elected to come out and look after them." He agreed to go to Tulsa for a 6-month trial in the oil business—and he has been there ever since.

He felt the business experience gained in his youth was invaluable in helping him take over major responsibilities with Barnsdall while still in his early twenties. Law first worked at the refinery at Barnsdall, Okla., then in the company's marketing department.

He was assistant secretary and a member of the board when he left to strike out on his own in 1935.

Falcon Seaboard's rise . . . Law joined with C. W. Alcorn and J. L. Stauss in forming Falcon Seaboard. He was 25 then.

From a small beginning—four wells were sunk the first year—the company has grown into a 28-rig outfit which has drilled 1,210 wells in Oklahoma, Kansas, Louisiana, Nebraska, Colorado, Wyoming, Texas, and West Virginia.

The cofounders are still with Falcon Seaboard, Alcorn as executive vice president and Stauss as executive vice president and treasurer.

The company has completed drilling contracts for almost every major operator in the Mid-Continent, Gulf Coast, and Rocky Mountain regions. At the same time, Falcon Seaboard explored and developed its own properties in Oklahoma, Kansas, Texas, and Louisiana. It is preparing to drill undeveloped leases in Utah.

Falcon Seaboard's rise has not been spectacular, but it has been steady. The firm has nine field discoveries to its credit. Perhaps the most notable is Adena field, in the Denver-Julesburg basin. Another prominent discovery in which Falcon Seaboard had a part was the southern flank of the Fausse Point Dome in Iberia Parish, Louisiana.

In recent years, Law has used the contract rigs to acquire some production. He has built it to 1,000 bbl. daily. The company has a geological department and now owns 115,000 acres of undeveloped leases. Law plans to keep strengthening the producing phase of his business, but wildcatting will be done rather conservatively. It will be on a pay-as-you-go basis.

Tradition assured . . . The family oil tradition is assured of continuing at least through the fifth generation. T. N. Law, Jr., an only child, is active in his father's organization. An industrial psychology graduate from the University of Tulsa, young Law is now insurance and safety director of the company.

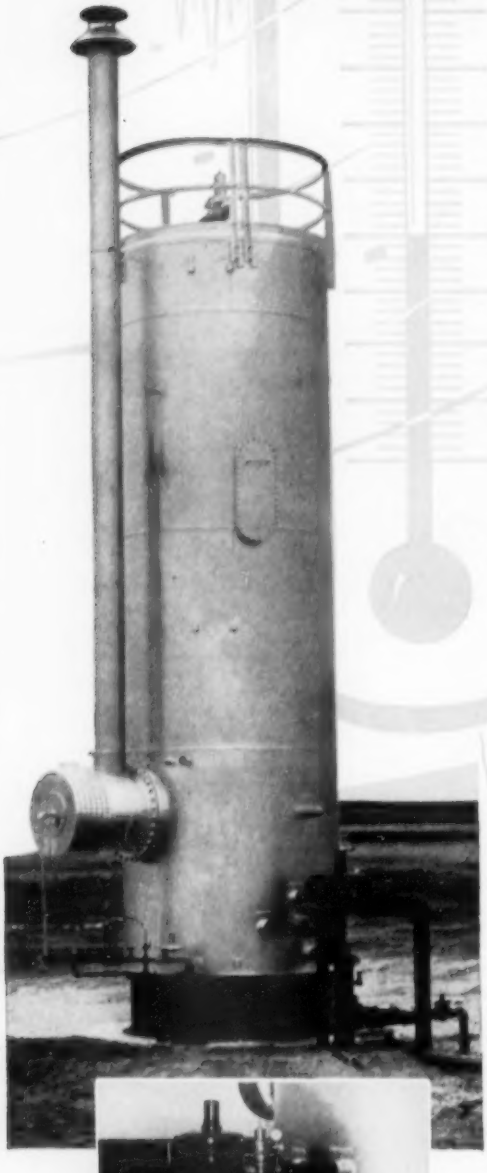
Besides heading his drilling concern, Law is a director of Braniff Airlines. He also finds time for service to industry organization, being a former vice president of the Independent Petroleum Association of America and a new director of the group.

W. C. Lenz, former superintendent of The Texas Co.'s Wichita Falls division, has been promoted to general superintendent of drilling and production for Texaco's West Texas producing department at Fort Worth. **P. D. Grommon** will succeed Lenz at Wichita Falls, and **C. P. Farmer** will succeed Grommon as assistant superintendent of the Panhandle district, Pampa, Tex.

Wayne M. McCann, petroleum staff member of Consumers Cooperative Association, Kansas City, Mo., has been chosen general manager of International Cooperative Petroleum Association in New York. The new job is effective January 15. McCann succeeds **Lloyd R. Marchant,** who has resigned.

George R. Elliot, petroleum consultant, has gone to Buenos Aires for a short Argentinan job. He recently returned from a 2-year assignment in Turkey and Yugoslavia with United Nations Technical Assistance Administration. Elliot for 17 years was a petroleum engineer in Phillips Petroleum Co.'s production department.

T. O. Collins, Texas Petroleum Co. drilling foreman, and **D. G. Sawyer,** petroleum engineer, have been transferred from Colombia to Venezuela. **J. E. Brown** has joined Texpet as a petroleum engineer.



All connections are grouped closely to the firebox to simplify hook-up and make it easy to house the controls for additional protection against cold weather.

neither snow, sleet nor freezing temperature affects the performance of

PARKERSBURG WINTERIZED TREATERS

Parkersburg engineers outsmarted the weather when they put *all the piping inside* the Parkersburg Winterized Treater — enabling it to withstand lower temperatures longer . . . perform more efficiently in any climate.

Radiation loss is materially reduced because inlet and outlet pipes are inside and rise to the top of the treater. Because the weir box and discharge pipe are inside the treater, discharge water is protected from freezing.

A rearrangement of the fire tube provides increased water capacity with less heat loss to the water. Additional pre-heating of the incoming emulsion takes place as it travels from bottom to top of treater through a pipe in the hot water and oil. All of this adds up to dependable, trouble-free performance of a Parkersburg Winterized Treater in the coldest climates.

• *Let your Parkersburg Representative put your cold climate treater troubles under wraps with a Parkersburg Winterized Treater.*

Parkersburg
RIG AND REEL COMPANY
DIVISION OF PARKERSBURG : AETNA CORPORATION

3345 WINTHROP AVENUE
FORT WORTH 16, TEXAS

5526

PESA

PERSONALS

Canadian Association Elects New Board

THE Canadian Petroleum Association recently elected officers and a board of governors at its third annual meeting in Calgary.

G. L. Knox, president of California Standard Co., was elected chairman. He succeeds P. L. Kartzke, Shell Oil Co.

All but two members of the new board are in the above photo. Sitting left to right are C. U. Daniels, Royalite Oil Co.; Knox; Kartzke; and George Dunlap, Sun Oil Co., chairman of the Alberta division. Standing left to right are D. M. Tyerman, McPherson, Leslie, & Tyerman; R. A. Cruickshank, Canadian Devonian Petroleums, Ltd., chairman of the Saskatchewan division; V. H. Hunter, Imperial Oil, Ltd.; Bart W. Gillespie, Oilwell Operators, Ltd.; C. E. Leach, Tide Water Associated Oil Co.; Vern Taylor, Imperial Oil, Ltd.; T. W. G. Thompson, Texaco Exploration, Ltd.; and E. D. Loughney, Canadian Gulf Oil Co. Not shown are R. A. Bishop, Sohio Petroleum Co., and R. C. Brown, Hudson's Bay Oil & Gas Co.

O. Q. Lomax, president of Humble Pipe Line Co., has been elected chairman of the Committee for Pipe Line Companies. Lomax succeeds **L. H. True,** president of Magnolia Pipe Line Co.

Seaborn L. Digby, vice chairman of the Federal Power Commission, has been reelected to serve during 1956. Digby, an FPC member since 1953, was conservation commissioner in Louisiana from 1948 to 1952.

J. H. Montgomery has resigned as division geologist for Sharples Oil Corp. at Midland, Tex., to join Youngblood & Youngblood, Dallas independent. Before joining Sharples, Montgomery was a Midland staff geologist for Magnolia Petroleum Co.

O. W. Crisman, former chairman of Gulf Oil Corp.'s offshore operating committee at Houston, has been promoted to offshore zone production superintendent with headquarters at Morgan City, La.

Ian Carmichael has been moved up from executive vice president and general manager to president of Warren Refining & Chemical Co., Cleveland. Carmichael succeeds **Bernard H. Schulist,** named to the newly created post of board chairman.

George M. Geyer has been promoted by Cities Service Oil Co. from production foreman at Eldorado, Kans., to district superintendent at Hobbs, N. M.

J. W. Wood, Jr., has resigned as reservoir engineer with Atlantic Refining Co. at Dallas to join J. Ray McDermott & Co., Inc., Houston.

A. W. Black, division geophysicist for Continental Oil Co. at Billings, Mont., has been moved up to assistant regional geophysicist at Denver. He is succeeded by **E. J. Griwetti,** former geophysical supervisor at Billings. Also promoted by Conoco: **John W. Strickland,** from research geologist at Denver to assistant division geologist at Casper.

Calvin C. McKee has been promoted by Warren Petroleum Corp. from general superintendent of the Midland Gasoline Co. plant, Conroe, Tex., to assistant chief engineer in Warren's Tulsa headquarters. McKee joined Warren in 1948, and excepting a year of military service during the Korean conflict, has been with the firm since.

Harold Rabling, veteran of 33 years of world-wide oil experience, has retired as a director of Standard-Vacuum Oil Co. Rabling was most active in Australia, where he served as director and board chairman of Vacuum Oil Co., Pty., Ltd., now a Stanvac subsidiary.

Frank A. Fuentes, former process and design engineer with Esso Research & Engineering Co., has joined International Petroleum Co., Ltd., as senior economist at Bogota, Colombia. Before working for Esso Research in Japan, Fuentes was with Phillips Petroleum Co. in Oklahoma.

Robert L. Sprague has been promoted by Shell Oil Co. from area exploitation engineer at New Orleans to district exploitation engineer at Lake Charles, La.

Arch W. Baucum, assistant to the president of The Texas Co. since 1954, has been made general manager of foreign operations (Western Hemisphere and West Africa), effective January 1. **Howard S. McCray,** refining operations manager, has been named Texaco purchasing manager. Baucum joined Texaco in 1934. He became assistant division petroleum engineer at Houston

A. W. BAUCUM

H. S. McCRAY

in 1942, and was transferred to Tulsa 2 years later as division petroleum engineer. After stints in Houston as assistant manager of the South Texas division and assistant to the production manager, he was transferred to New York. McCray, who joined Texaco in 1926, is former superintendent of the Fort Neches and Amarillo, Tex., Lawrenceville, Ill., and Lockport, Ohio, works. He was transferred to the New York post in 1954.

PERSONALS

Los Angeles Club Honors Founders

Pioneer directors and past presidents of the Los Angeles Petroleum Club were honored at a recent luncheon at the club's Statler Hotel headquarters. Scrolls were given guests in tribute to their past efforts on behalf of the group and a commemorative plaque was unveiled. At the luncheon, hosted by A. C. Rubel, Union Oil Co. of California, were, seated left to right: J. C. Kelley, Hillman-Kelley; R. Eckis, Richfield Oil Corp.; D. E. Day, Richfield Oil Corp.; Rubel; L. L. Aubert, Bankline Oil Co.; M. Kline, attorney; H. Salvatori, Western Geophysical Co.; and J. G. Leovy, Western Gulf Oil Co. Standing, left to right, are G. Campbell, General Petroleum Corp.; T. Sherman, Hamilton & Sherman; T. Wallace, Western Gulf Oil Co.; O. Lane, Continental Oil Co.; P. Whealton, consultant, and R. Sherman, consultant.

Wilbert K. Smith has been promoted from assistant superintendent to superintendent of Ohio Oil Co.'s Martinsville, Ill., pipeline division. Smith succeeds **Oscar M. Jaco,** who retired recently after 46 years' service.

SAM L. JACKSON

Sam L. Jackson, manager of product pipelines for Standard Oil Co. (Ind.) will become transportation manager January 1. He will direct products movement and products pipeline and marine facilities operation. **W. A. Bennett,** formerly Jackson's assistant, will become distribution manager. Jackson came to Indiana Standard in 1951 from Service Pipeline Co., a subsidiary.

C. E. Christie, Sinclair Pipe Line Co. district superintendent, has been transferred from Houston to Corpus Christi.

John L. Fitch has been promoted to senior research chemist at Magnolia Petroleum Co.'s field research laboratories in Dallas. Fitch, who will specialize in reservoir chemistry, has been with the lab technical staff since 1951. **P. L. Lawrence,** a Magnolia technical staff member since 1949, has been moved up to senior research chemist.

W. M. Murray, vice president of Deep Rock Oil Co., Oklahoma City, has been elected to head the National Grease Institute during 1956. Other new officers: **J. W. Lane,** manager of Socony Mobil Oil Co., Inc.'s automotive division, lubricating department, vice president; and **A. J. Daniel,** president of Battenfield Grease & Oil Corp., Kansas City, treasurer.

Jan G. Schaafsma has been named to manage General Petroleum Corp.'s laboratories department in Los Angeles.

G. E. Meacher has been promoted by Standard Oil Co. of California from the Los Angeles offices to assistant production foreman in the Ventura-Castaic area office.

DEATHS

Charles Willis Hughes, 64, production manager of Arkansas Fuel Oil Corp., died December 8 in his Shreveport home. Hughes had been with Arkansas Fuel Oil and predecessors since 1929. He was the firm's production superintendent from 1936 to 1953, when he became manager.

Donald L. Olson, 45, Tulsa district manager of Gardner-Denver Co., oil well supply firm, died December 9 in Tulsa. He had been with Gardner-Denver 20 years.

Walter F. Britain, 70, retired Montana independent operator, died recently at his home in Gold Hill, Ore. Britain was a former secretary of the Montana Oil & Gas Association, Montana Petroleum Industries Committee, and Rocky Mountain Oil & Gas Association.

Charles Tufts Stewart, 72, pioneer employe of Standard Oil Co. of California, died recently in Los Angeles. Stewart for many years was Socal's foreman of drilling tools and equipment in the Coalinga-Taft area. He retired in 1949.

Boyd Ozment, chief dispatcher for Buckeye Pipe Line Co. at Macungie, Pa., died recently in his Allentown, Pa., home. Before joining Buckeye, Ozment was with Oklahoma Pipe Line Co., Ajax Pipe Line Co., Illinois Pipe Line Co., and Plantation Pipe Line Co.

Floyd W. Holder, Breckenridge, Tex., independent operator, died December 9 in a Fort Worth hospital.

Edward W. Ames, 67, geologist for Rock Hill Oil Co. in Abilene, Tex., died there December 8.

1885

70 TO GROW ON...

1955

These seventy years of Stearns-Roger association with process engineering and plant construction have seen the development of automotive transportation, electronics, aviation, nucleonics, synthetics, and petroleum.

Stearns-Roger has been closely identified with the oil and gas industry of the nation. Processing plants designed and built by Stearns-Roger spread throughout the industry from the extreme cold of the Canadian border to the mild conditions of the Texas Gulf.

Starting with analysis of well-head gas, our facilities are complete for handling all successive steps through process design, general engineering, fabrication of special equipment in our shops, and field installation with our own personnel. We deliver a completed plant, operating to meet the customer's long-term needs.

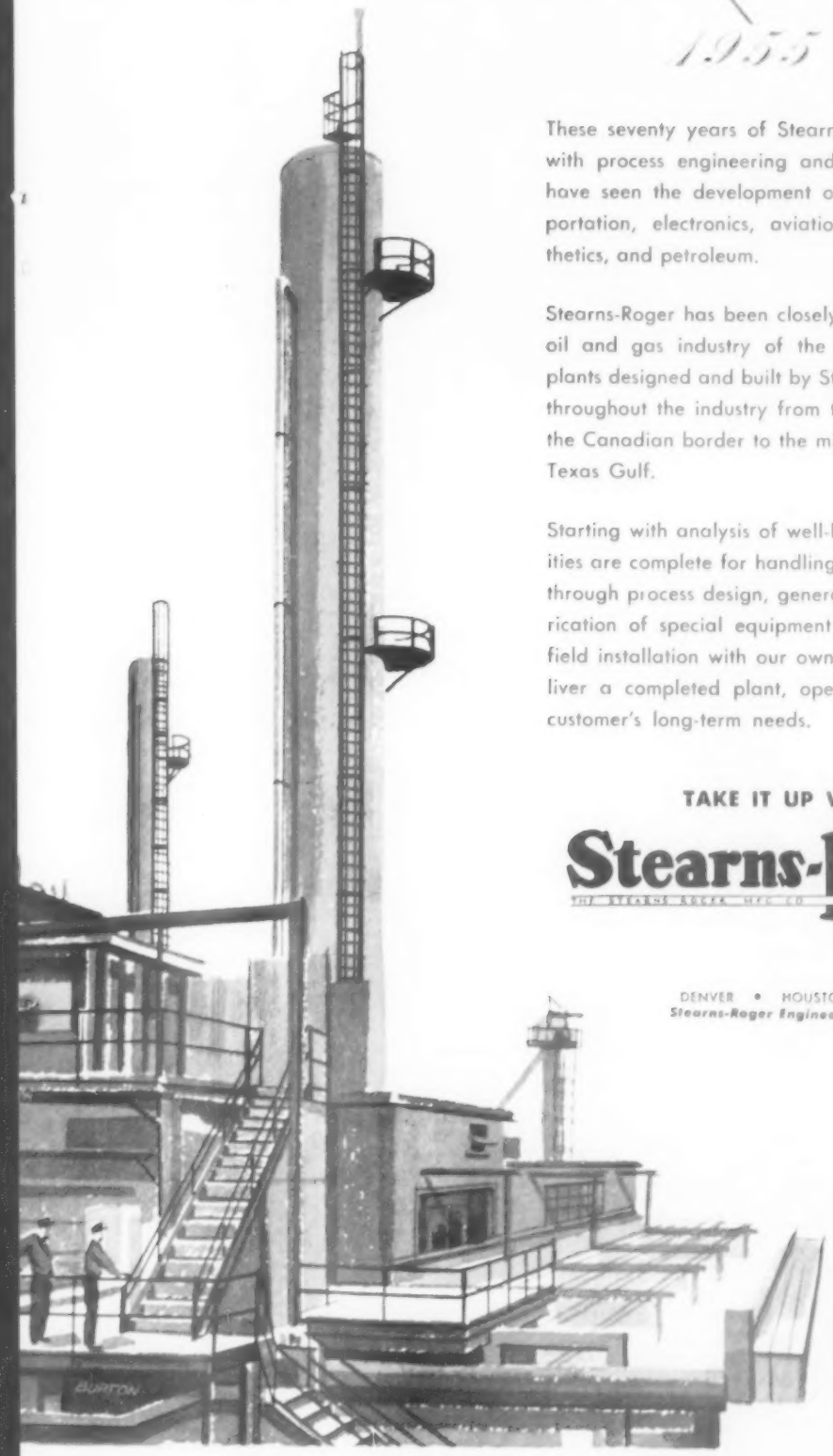
TAKE IT UP WITH

Stearns-Roger

THE STEARNS-ROGER MFG. CO. DENVER, COLORADO

DENVER • HOUSTON • EL PASO • SALT LAKE CITY

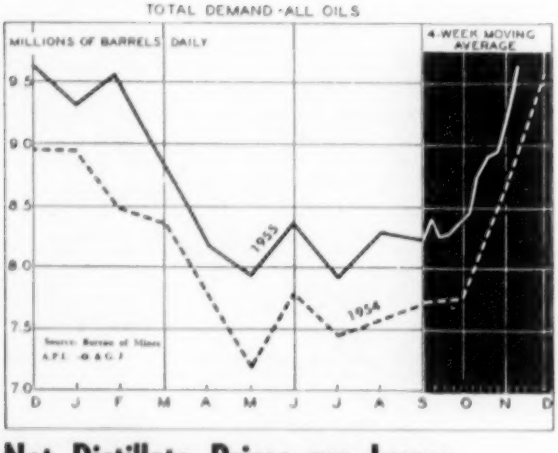
Stearns-Roger Engineering Company, Ltd., Calgary, Alberta



Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,894,850	UP	42,725	UP	515,253
Crude stocks	257,693,000	DOWN	46,000	DOWN	9,646,000
Completions	1,225	UP	164	UP	48
Refinery runs	7,618,000	DOWN	183,000	UP	513,000
Gasoline stocks	158,374,000	UP	839,000	UP	7,721,000
Distillate stocks	134,413,000	DOWN	5,690,000	UP	10,346,000
Residual stocks	42,767,000	DOWN	1,389,000	DOWN	10,036,000
Four-product stocks	367,559,000	DOWN	7,456,000	UP	5,826,000
Total imports	1,467,400	UP	218,200	UP	370,000



Net Distillate Prices are Lower Than They Were Last Summer

DESPITE the recent increase of 0.125 cent a gallon in the Group 3 postings for distillate fuels, the net price on northern deliveries is less than it was last summer when some sales were made below posting.

The current loss can be charged to volumetric changes due to differences in loading temperatures. Interrefinery contracts for sales of refined products as well as purchases of crude contain a provision that all volumes must be corrected to 60° F. On this basis, a gallon of No. 2 fuel is the same in both summer and winter.

But, most of the final sales by a supplier are on a basis of metered gallons. When temperatures are high in the summer months, a metered or measured gallon does not contain as much actual fuel as a standard gallon corrected to 60° F. If a supplier started with 10,000 standard gallons of No. 2 fuel and metered it out when temperatures were about 85°, the gain in volume would be enough to represent a gain in price of about 0.125 cent a gallon.

The Group 3 posting for No. 2 fuel last July was 8.25 cents a gallon. There were reports of some discounting from this posted price. If a supplier was selling No. 2 fuel for 0.125 cent under the posting, the discount was offset by the increase in volume due to high temperatures. He still was netting 8.25 cents for corrected gallons.

Recent deliveries at some of the northern pipeline terminals have been at temperatures as low as 5°. Before the winter is over some material will be metered at temperatures below 0° F. At these low temperatures, the shrinkage in volume is equivalent to a drop of about 0.25 cent a gallon in price. A supplier selling No. 2 on a basis of the current Group 3 price of 8.375 cents a gallon is actually receiving only 8.125 cents for a standard or corrected gallon.

The current selling price is equal to the net selling price last summer for a supplier who was giving a discount of 0.25 cent off posting.

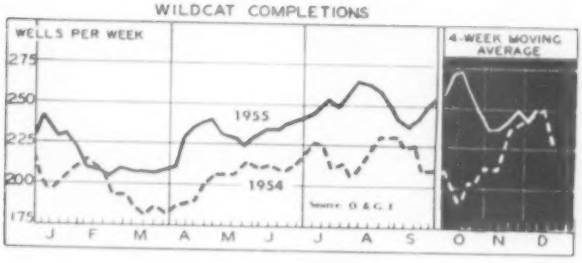
Because of this cold-weather loss, Group 3 refiners are not actively soliciting spot sales of distillate fuels at current prices.

Pennsylvania gasoline prices . . . Atlantic Refining Co. adjusted tank-wagon prices for gasoline in Pennsylvania, effective December 12. The company also suggested retail prices for regular and premium grades. The new tank-wagon prices represent advances in all of the depressed areas of the state. Other important gasoline suppliers in Pennsylvania have met Atlantic's new tank-wagon prices.

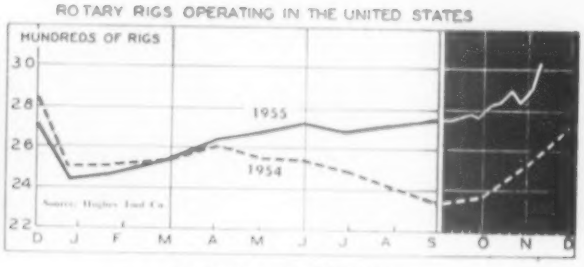
Gasoline prices in some of the price-war areas of New England may be returning to more normal levels. Socony Mobil Oil Co., Inc., advanced its posted prices in the price-war areas of Massachusetts, Connecticut, and Rhode Island, effective December 9. At least four other companies had met the increase by December 12.

Continuing higher tanker rates are serving to keep pressure on Gulf Coast markets. Price shading is reported for distillates and some grades of gasoline.

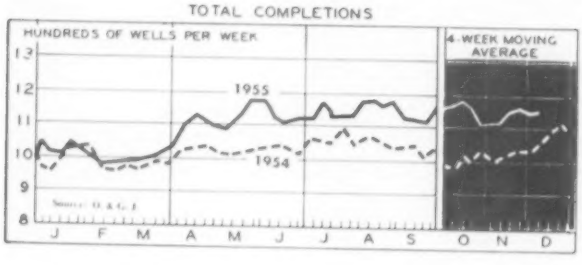
WILDCAT COMPLETIONS



ROTARY RIGS OPERATING IN THE UNITED STATES



TOTAL COMPLETIONS



ACTIVE ROTARY RIGS*

Area	12-12-55	Change from 12-5-55	Change from 12-13-54
Gulf Coast	648	46	71
N. and W. Texas-New Mexico	1,033	26	140
Arkansas-N. Louisiana-E. Texas	195	13	—5
Oklahoma	375	14	43
Kansas-S. Nebraska	199	0	9
Illinois-Eastern	143	3	—5
Rocky Mountain	283	4	34
Pacific Coast	152	7	3
Total United States	3,028	113	290
Western Canada	190	—8	—22

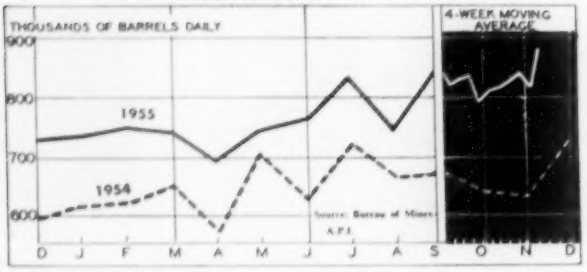
*Hughes Tool Co.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED DECEMBER 10, 1955

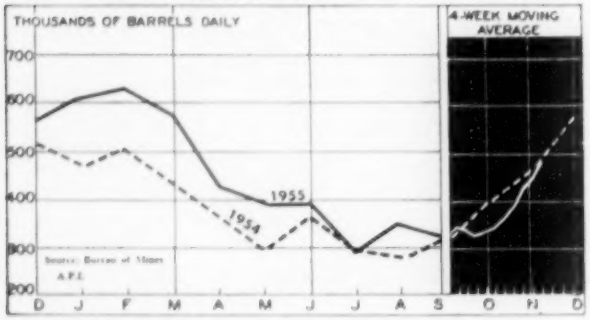
	Total of all wells: Comp.	Oil	Gas	Dry	Footage	Cum. 1955	Cum. 1954	Wildcat completions and discoveries: Oil	Dist.	Gas	Dry	Total	Cumulative total, 1955: Oil	Dist.	Gas	Dry	Total
Ala.-Ga.-Fla.	1	0	0	1	6,856	69	95	0	0	0	1	1	1	0	0	66	67
Arkansas	10	4	1	5	30,876	779	574	0	0	0	1	1	34	1	4	164	203
California	46	26	2	18	213,725	2,299	2,235	0	0	0	18	18	41	0	12	434	487
Colorado	42	12	2	28	225,639	1,415	1,273	1	0	0	17	18	48	0	23	682	753
Illinois	72	36	0	36	164,379	3,682	2,803	1	0	0	5	6	66	0	5	520	591
Indiana	30	11	0	19	55,675	685	822	0	0	0	6	6	11	0	0	246	257
Kansas	119	60	5	54	376,856	4,747	4,293	2	0	1	21	24	130	1	34	803	968
Kentucky	68	36	1	31	83,643	1,523	1,094	0	0	1	11	12	52	0	10	318	380
Louisiana	67	48	3	16	495,548	3,815	3,305	0	4	0	7	11	106	80	28	445	659
North	30	19	2	9	109,494	1,983	1,813	0	0	0	4	4	25	11	4	189	229
South	37	29	1	7	386,054	1,832	1,492	0	4	0	3	7	81	69	24	256	430
Michigan	10	2	0	8	29,739	497	539	0	0	0	7	7	12	0	1	191	204
Mississippi	9	2	0	7	61,678	433	403	0	0	0	3	3	14	0	0	161	175
Montana	12	7	0	5	43,962	377	312	0	0	0	2	2	13	0	1	141	155
Nebraska	18	5	0	13	101,567	837	417	1	0	0	9	10	44	0	1	351	396
New Mexico	21	12	2	7	95,889	1,604	1,044	0	0	0	2	2	39	2	10	119	170
Northwest	3	0	1	2	10,452	561	378	0	0	0	0	0	8	1	10	42	61
Southeast	18	12	1	5	85,437	1,043	666	0	0	0	2	2	31	1	0	77	109
North Dakota	6	4	0	2	42,367	244	294	1	0	0	1	2	7	0	0	60	67
Ohio	23	10	5	8	49,113	1,146	1,095	0	0	0	0	0	3	0	8	16	27
Oklahoma	189	108	8	73	689,834	8,076	8,269	3	1	0	24	28	132	19	27	625	803
Pennsylvania-New York	19	2	14	3	53,602	1,405	2,075	0	0	0	0	0	0	0	7	10	17
Texas	428	257	15	156	1,599,499	19,089	17,429	14	4	4	109	131	742	108	124	3,924	4,898
Southwest (1 & 4)	84	54	2	28	273,540	2,941	2,428	2	2	1	21	26	113	36	37	742	928
Gulf Coast (2 & 3)	43	15	4	24	317,362	2,382	2,454	2	2	1	18	23	88	59	41	640	828
East (5 & 6)	26	11	4	11	120,568	944	944	1	0	1	10	12	23	5	10	314	352
North Central (7-B & 9)	184	96	2	86	547,045	7,125	6,630	4	0	0	56	60	352	0	16	1,559	1,927
West (7-C & 8)	68	62	1	5	240,181	4,698	4,071	2	0	1	3	6	156	1	11	634	802
Panhandle (10)	23	19	2	2	100,753	999	902	3	0	0	1	4	10	7	9	35	61
Utah	0	0	0	0	0	81	82	0	0	0	0	0	6	0	6	51	63
West Virginia	15	0	11	4	39,466	614	575	0	0	1	0	1	0	0	12	20	32
Wyoming	20	9	1	10	107,357	850	1,162	0	0	0	5	5	25	0	8	206	239
Miscellaneous	0	0	0	0	0	58	116	0	0	0	0	0	4	0	3	46	53
Total United States	**1,225**	651	70	504	4,567,220	54,325	50,306	23	9	7	249	**288**	1,530	211	324	9,599	11,664
Total previous week	1,061	601	58	402	4,246,386			24	7	4	187	222	1,507	202	317	9,350	11,376
Total December 11, 1954	1,177	671	76	430	4,718,154			52	1	11	198	262	1,403	130	385	8,606	10,524
Western Canada	61	44	4	13	247,723												

Service wells included: *2, †1, ‡12.

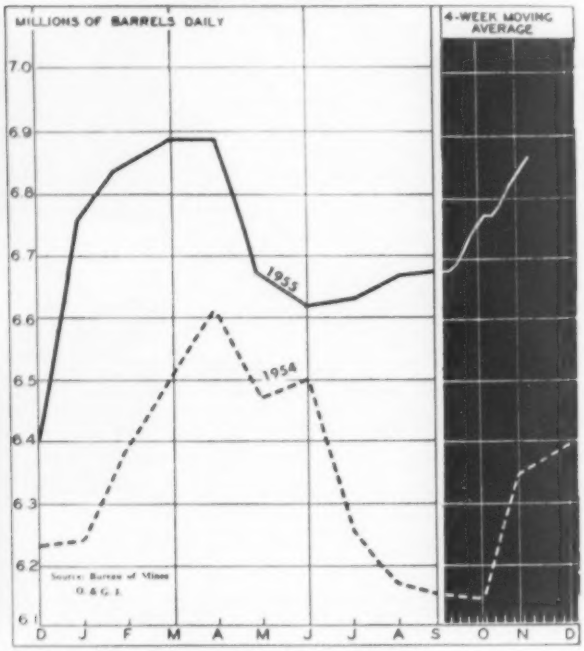
CRUDE IMPORTS



PRODUCT IMPORTS



CRUDE-OIL PRODUCTION

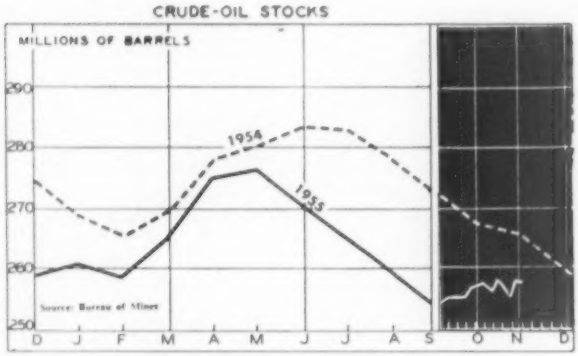


DAILY AVERAGE PRODUCTION FOR WEEK

	December 10 Lease Crude oil	Lease condensate	Total	Dec. 3 total
Alabama	4,300		4,300	4,200
Arkansas	73,750	400	74,150	73,900
California	976,400		976,400	972,100
Colorado	146,500		146,500	149,700
Eastern	52,100		52,100	52,100
Florida	1,350		1,350	1,350
Illinois	222,700		222,700	226,900
Indiana	28,000		28,000	28,200
Kansas	335,500		335,500	334,600
Kentucky	41,000		41,000	40,000
Louisiana	711,800	58,800	770,600	764,125
North	113,800	2,800	116,600	115,850
South	598,000	56,000	654,000	648,275
Michigan	30,400		30,400	31,900
Mississippi	707,300	5,050	112,350	111,100
Montana	39,700		39,700	40,300
Nebraska	27,800		27,800	27,400
New Mexico	209,800	4,050	213,850	227,300
North Dakota	35,100		35,100	35,900
Oklahoma	566,200		566,200	549,700
Texas	2,887,000	53,250	2,940,250	2,902,550
Dist. 1	56,000	600	56,600	55,175
Dist. 2	154,000	8,100	162,100	160,250
Dist. 3	414,000	25,200	439,200	434,900
Dist. 4	241,000	5,400	246,400	244,975
Dist. 5	49,000	525	49,525	49,175
Dist. 6	126,500	5,800	132,300	131,225
East Texas field	223,500		223,500	220,650
Dist. 7-B	150,000	50	150,050	149,325
Dist. 7-C	175,000	4,800	179,800	176,225
Dist. 8	992,000	2,000	994,000	974,725
Dist. 9	216,000	575	216,575	215,725
Dist. 10	90,000	200	90,200	90,200
Utah	4,600		4,600	4,800
Wyoming	271,800		271,800	273,400
Others	†200		†200	‡100
Total U. S.	6,773,300	121,550	**6,894,850**	6,852,125
Change from previous week, up			**42,725**	
Canada	†371,600		†371,600	†400,175
Total U. S. production January 1-December 10			2,321,843,300 bbl.	
Same period last year (crude plus cond.)			*2,181,936,628 bbl.	

*Includes 33,640,350 bbl. distillate. †Week ended previous Monday. ‡S.D. 100. Nov. 100.

CRUDE-OIL STOCKS



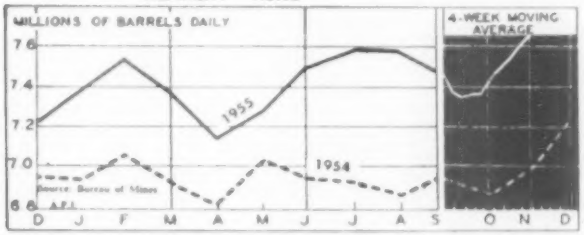
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

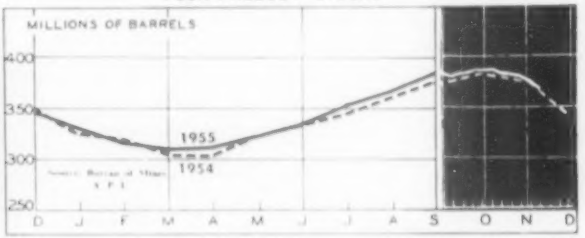
	12-3-55	11-26-55	12-4-54
Pennsylvania Grade	2,991	3,129	3,120
Other Appalachian	2,117	2,159	1,835
Illinois, Indiana, Michigan	9,808	9,716	12,021
Nebraska, North Dakota	2,154	2,079	1,658
Kansas	7,662	7,609	8,341
Oklahoma	21,426	22,205	26,083
Arkansas	2,418	2,465	3,223
Louisiana	16,797	16,745	15,482
North	3,052	2,664	2,436
South	13,745	14,081	13,046
Mississippi	2,685	2,800	2,962
New Mexico	7,447	7,435	8,601
Texas	122,053	121,176	121,230
East Texas proper	9,549	9,692	9,878
West Texas	56,284	56,756	53,168
Texas Gulf	25,367	24,288	24,338
Other Texas	30,853	30,440	33,846
Wyoming	15,007	14,923	13,309
Other Rocky Mountain	5,823	6,263	5,996
California	26,901	26,775	31,730
Foreign	†12,404	12,260	11,748
Total	257,693	257,739	267,339

*Bureau of Mines. †Includes 2,458,000 bbl. in California.

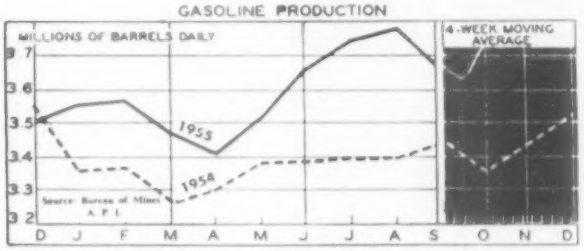
REFINERY RUNS



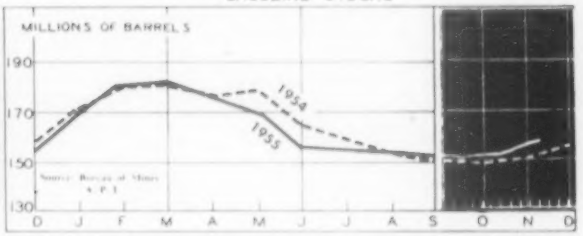
FOUR-PRODUCT STOCKS



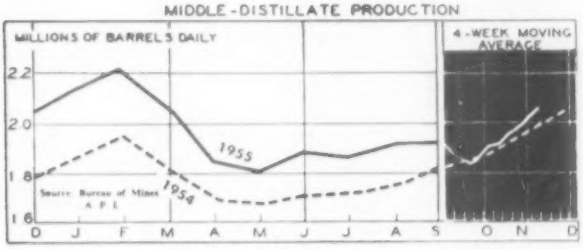
GASOLINE PRODUCTION



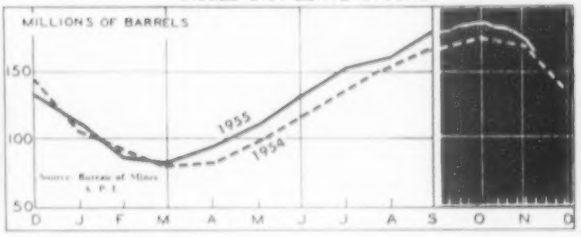
GASOLINE STOCKS



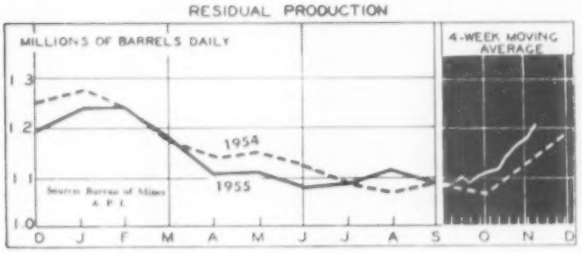
MIDDLE-DISTILLATE PRODUCTION



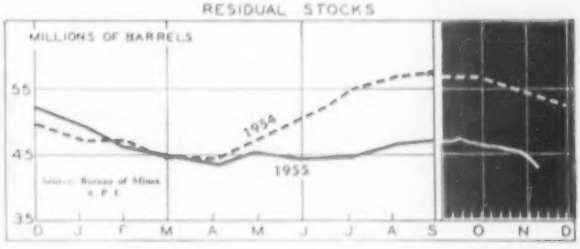
MIDDLE DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



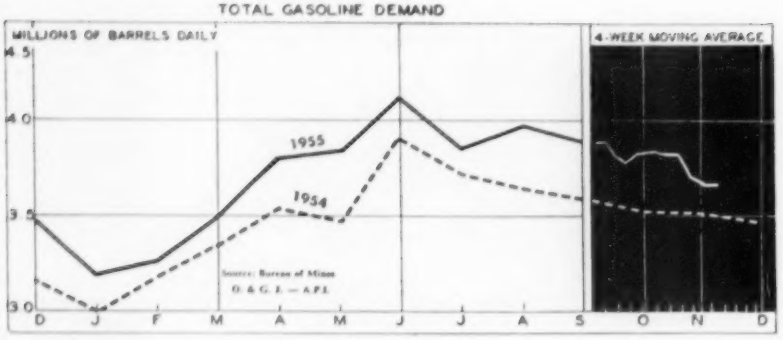
A.P.I. REFINERY REPORT, DECEMBER 9

(Thousands of barrels)

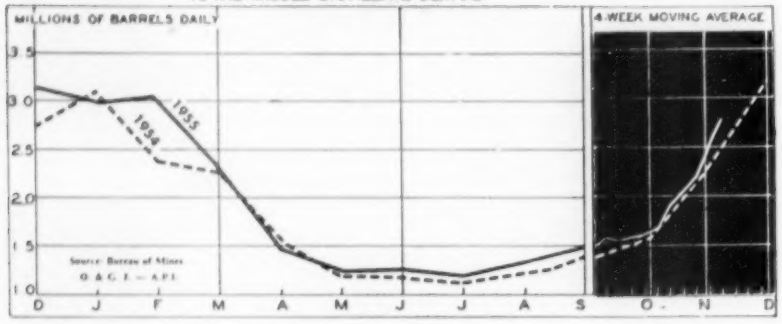
District	Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.	Stocks†—Gaso.‡	Kero.	Dist.	Resid.	Bureau of Mines, December 1954—Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.
East Coast	1,080	449.6	23.0	261.1	259.2	35,900	13,413	51,199	12,231	1,048	426.2	34.3	281.0	249.0
Appalachian:														
District 1	100	39.7	6.8	26.0	6.7	4,481	638	2,819	558	98	40.9	6.4	20.5	9.2
District 2	104	52.2		26.6	12.0	2,388	480	1,011	383	75	36.4	6.6	13.2	9.5
Ind., Ill., Ky.	1,415	756.7	80.4	289.2	187.1	32,527	7,631	24,357	4,232	1,341	716.6	78.7	278.2	186.7
Okla., Kans., Mo.	713	412.7	15.7	182.1	40.4	16,054	1,760	13,794	1,584	645	361.7	20.6	167.0	44.3
Inland Texas	259	193.4	15.6	43.4	25.6	5,657	476	2,578	1,330	239	171.5	11.9	46.1	18.3
Texas Gulf Coast	1,854	863.4	129.8	500.9	257.7	20,852	3,224	15,465	7,018	1,797	835.3	139.6	468.0	226.4
La. Gulf Coast	660	372.0	65.0	125.3	44.3	9,417	2,507	6,521	1,413	606	307.4	61.8	159.9	38.9
N. La. and Ark.	96	30.9	4.9	28.0	8.6	3,730	1,165	2,427	115	88	35.8	9.1	20.5	7.8
Rocky Mountain:														
New Mexico	20	10.7		3.4	2.7	234	9	50	29	20	11.6	0.7	3.3	3.0
Other Rocky Mtn.	239	119.4	6.9	51.7	41.9	5,384	314	2,624	803	248	123.6	5.1	59.6	42.3
California	1,078	491.6		157.0	350.7	21,710	388	11,568	13,071	1,033	448.4	5.7	151.0	351.9
Dec. 9, 1955	7,618	3,792.3	348.1	1,694.7	1,216.9	158,374	32,005	134,413	42,767	7,238	3,515.4	380.5	1,668.3	1,187.3
Dec. 2, 1955	7,801	3,851.9	330.3	1,782.1	1,192.9	157,535	33,221	140,103	44,156					
Dec. 10, 1954	7,105	3,512.7	383.6	1,539.6	1,125.7	150,653	34,210	124,067	52,803					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

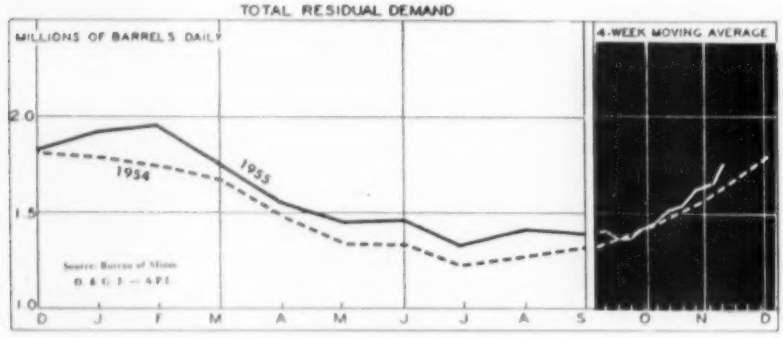
TOTAL GASOLINE DEMAND



TOTAL MIDDLE-DISTILLATE DEMAND



TOTAL RESIDUAL DEMAND



REPRESENTATIVE QUOTATIONS

Spot-market quotations of leading suppliers as of December 14, 1955. Prices are in cents per gallon, except for residual in dollars per barrel and wax in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	11-11.25	11.5-12	10.375-10.75
Premium gasoline	12.5-12.75	13-13.75	12-12.25
42-44 w.w. kerosine	9.50-9.75	10.55	8.5-9.0
No. 2 straw fuel oil	8.50-8.75	10.05	8.25-8.75
No. 6 residual	$1.85-1.95	$2.65-2.75	$2.10-2.20

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5.875	5.5	5.75
Grade 18-55	7.05	6.7	6.95

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	20
200 vis., No. 3 neutral, 0-10 pp.	15.25

WAX

Mid-Continent

132-134 A.M.P.	0.6

• High tanker rates are adding pressure on Gulf Coast markets. Current rates are about 135 per cent above Maritime Commission base rates compared with about 20 per cent under MC in October. Contracts for consecutive voyages indicate that shippers do not expect spot rates to go below MC plus 100 per cent for the next few months.

PRODUCTION AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

	Refinery prod.	Total demand
Gasoline:		
Four weeks ended 12-9-55	3,786	3,669
September 1955	3,696	3,877
November 1954	3,428	3,505
December 1954	3,515	3,455
Middle distillate:		
Four weeks ended 12-9-55	2,058	2,787
September 1955	1,899	1,565
November 1954	1,976	2,247
December 1954	2,049	3,112
Residual fuel:		
Four weeks ended 12-9-55	1,204	1,771
September 1955	1,061	1,350
November 1954	1,120	1,560
December 1954	1,187	1,819

SUPPLY AND DEMAND*

(Thousands of barrels daily)

	Sept. 1955	Aug. 1955	Sept. 1954
Domestic demand	**8,016**	**8,084**	**7,456**
Gasoline	3,779	3,930	3,490
Kerosine	234	197	219
Distillate	1,243	1,090	1,096
Residual	1,262	1,332	1,302
Jet fuel	173	158	144
Lubricants	119	129	110
L.P.G.	396	350	306
Other products	773	852	726
Crude loss	37	46	63
Exports	**372**	**416**	**304**
Gasoline	98	103	96
Kerosine	9	10	10
Distillate	79	80	55
Residual	88	107	66
Jet fuel		1	
Lubricants	40	41	34
L.P.G.	11	11	10
Other products	19	24	16
Crude	28	39	17
Total demand	**8,388**	**8,500**	**7,760**
Gasoline	3,877	4,033	3,586
Kerosine	243	207	229
Distillate	1,322	1,170	1,151
Residual	1,350	1,439	1,368
Jet fuel	173	169	144
Lubricants	159	170	144
L.P.G.	407	361	316
Other products	792	876	742
Crude exp. and loss	65	85	80
Stock change	**288**	**20**	**67**
Crude	—5	—264	—214
Products	293	284	281
New supply	**8,676**	**8,520**	**7,827**
Imports	**1,218**	**1,155**	**998**
Crude	829	755	672
Products	389	400	326
Production	**7,458**	**7,365**	**6,829**
Crude	6,730	6,665	6,151
Nat. gasoline, etc.	728	700	678
Runs to stills	**7,482**	**7,580**	**6,939**

*Bureau of Mines.

(The schedule of selected crude prices appeared on page 189 of the December 12 issue and will be printed again next week.)

Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY... CLASSIFIED ADVERTISING

UNDISPLAYED CLASSIFIED 23c a word one issue. 10% Discount three or more consecutive issues. $4.00 minimum charge. Blind Box in our care nine words. Payable in Advance.

DISPLAY CLASSIFIED
$16.00 a column inch one issue . . .
10% Discount three or more issues.

Address Classified Advertising Material: The Oil and Gas Journal, P. O. Box 1260, Tulsa 1, Okla.

FOR SALE EQUIPMENT

GARDNER-DENVER two-stage gas compressor unitized unit powered by 250 H.P. Buda motor and all equipment, gauges and coolers necessary to operate. All in first-class condition. Gulf Southwest Service Co., P. O. Box 1328, Shreveport, La. Telephone 2-8428.

FOR SALE: Used R. L. Cardwell Drilling-in Unit. Splendid condition with all accessories and large Doghouse. Located near Wichita. Phone or write John Richard, McClelland Hotel, Wichita, Kansas; or write Box 361, Topeka, Kansas.

EXCELLENT CONDITION—9200 ft. 2⅞" Hydril drill pipe, @ $1.50 per ft. Contact Wichita Pipe & Supply, P. O. Box 1803, Wichita Falls, Texas. Phone 3-8197.

FOR SALE

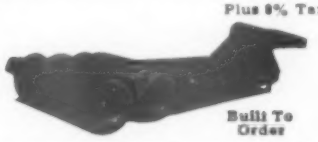
1—100 H.P. G.A.W. Cooper-Bessemer Gas Engine with parts to convert to Diesel fuel. Good condition.
2—VIK Waukesha
3—FCU Waukesha
2—XAH Waukesha
1—U2 International
Good condition. Location 16 miles North Nocona, Texas.

Call

J. B. Stoddard,
500 Trinity Universal Bldg.,
Dallas, Texas, to arrange inspection.

NEW TRAILERS

DROP—BED "TYPE" $2,731.48
FLAT—BED "TYPE" 2,636.89
Plus 8% Tax



Built To Order

PASKO MACHINERY & STEEL
1721 CHICAGO DRIVE S. W.
GRAND RAPIDS, MICHIGAN

GASOLINE PLANT EQUIPMENT FOR SALE

3—800# MMCF Absorbers with Scrubbers, etc.
1—30" x 62' Depropanizer with Accumulator, Reboiler and Condenser.
1—Fluor "Counterflo" Induced Draft Cooling Tower Complete.

Other equipment, Instruments, Pumps, Pipe, Valves and Fittings necessary in Gasoline Plant Construction. Detailed Inventory Available upon request.

SOUTHERN PRODUCTION COMPANY, INC.
P. O. Box 670, Phone FAnnin 8103,
Fort Worth, Texas

FOR SALE EQUIPMENT

4500' 4½" STANDARD LINE. All good threads and couplings, good body. Price 70c. M. J. Regan Pipe Co., Coffeyville, Kans.

FOR SALE: 86' Oilwell Mast, with 4½ Substructure. Telephone: CE 2-6318, Oklahoma City, Okla.

FOR SALE: Walker-Neer C-37 Cable Tool Rig fully equipped and ready to work to 8500 feet. For further information and complete inventory of tools please call or write Big State Tool Company, P. O. Box 2024, Phone 7-3052, Odessa, Texas.

BARGAIN

New Tool Steel Pump Liners in original packages. Sacrificing at one-half regular price to clear remaining stocks. Wide selection of types and sizes. Call or write:

DYKES, INC. CA 4-7817
1121 Rothwell—Houston, Texas

ROTARY DRILLING RIGS FOR SALE

1—250 double drum Emsco triple Lee C. Moore Derrick—twin GMC.
8' sub structure—27½x14 Gardner-Denver pump, twin GMC. 5000 to 6000' of 3½" drill pipe, light plant etc. A complete drilling rig.
1—Model RL Cardwell pole mast Derrick handles doubles, 7' sub structure, 5000—3½" drill pipe, 7½x14 Gardner-Denver pump, light plants, all tools, tanks etc. All in excellent operating condition. This rig does a nice job with 3½" drill pipe to 5000 feet.

These two rigs are clean, late models in top mechanical condition with everything needed to start drilling.

Will sell on time or take part payment in drilling to responsible firm or persons.

Lubbock Machine & Supply
North Avenue H., P. O. Drawer 1589,
Lubbock, Texas

FOR SALE EQUIPMENT

GAS METERS: Foxboro, Emco and Westcott Orifice Meters for sale. Geo. R. Milner, Box 124, Okmulgee, Okla.

FAILING 1500 heavy duty drill with 4½ x 5 pump, automatic pulldown, and mounted on Ford truck. Write P. O. Box 819, Longmont, Colo. Phone 1333.

FOR SALE OR LEASE

Kiowa Oil Company Yard, approximately three acres at Great Bend, Kansas, consisting of
1 Quonset Building, 100' long, 40' wide, 20'3" high; 2 room office in one end of building, all cement floor modern.
1 One story duplex building, 4 rooms on each side with bath.
1 Tool shed, 16x30.
1 Tool Building 26x30.
10 Welded casing Racks made out of 4" drill pipe.
1 Truck Garage 31x61.
Yard is enclosed with 8' Wire Mesh Fence.

Contact KIOWA OIL COMPANY,
717 Union National Bank Bldg.,
Wichita 2, Kansas,
Phone FO 3-8013.

SAVE MONEY

on

8" LINE PIPE

LAPWELD 8⅝" O.D. 28.55

Very good No. 1 grade, used pipe. Straight 20' single random lengths machine cleaned.

Choice of plain end or T&C. Ideal for oil, water and gas systems, 850 to 900 psi. Pipe located in Illinois, with low barge, rail and water rates to any part of the world. Priced below market, selling at almost ½ cost of equivalent new pipe. Will sell for cash or will finance meritorious propositions.

Brokers and agents protected.

REDNEB PIPE CO.
P. O. Box 1798 Shreveport, La.
Phone 4-7767—68

Liquidating Oil Refinery

FORMER PURE OIL COMPANY REFINERY, CHARLESTON (CABIN CREEK) W. VIRGINIA
6,000 Bbl. Topping—3,000 Bbl. Thermal Cracking, 100 Bbl. Catalytic Polymerazation—Lube Oil and Paraffin Wax Plant, Rerun Unit, 8500 Gal. Ethyl Plant, Boiler Plant, Tank Farm, Instruments—Complete Refinery Pipe, Valves, Fittings, etc.—Visit the plant—salesmen on premises.

Every item offered at a fraction of original cost. Detailed catalogue of major items mailed on request.

BROWN-STRAUSS CORPORATION

1546 Guinotte Ave. Phone HArrison 1000 Kansas City, Missouri
FIELD OFFICE
Cabin Creek (Suburb of Charleston) W. Virginia
Tel. East Bank 5611—Mail Address P. O. Box 2921
Roy Crisp—Manager—Charleston, West Virginia

FOR SALE EQUIPMENT

ANOTHER BRILL LIQUIDATION!

FORMER LACY REFINERY,

BIG SANDY, TEXAS

COMPLETE POLY UNIT, BUILT 1950

1—Wyatt 30" x 70' Stabilizer 160# 30 tray
3—Absorbers, 14" x 40', 20" x 50', 160#
2—Wash Towers, 18" x 23', 150#
1—Reactor, 24" x 28', 550#
1—Depropanizer, 20" x 35', 450#
1—Debutanizer, 12" x 26', 120#
3—Brinkman vertical tube furnaces 2, 1¼ mil. BTU/hr.
20—Brown fintube exchangers, 600# 140 sq. ft. 4-6 chrome.
20—Brown fintube exchangers, 600# 11, 21, 77, 101, 140 sq. ft.
3—Adm. heat exchangers 424, 346, 176 sq. ft.
3—Perco reactors 4500 gal., 8' x 12', 347 stls. st. 120#, 1000° F.
1—5' x 90' tower, 40 tray, 135# WP
1—7' x 20' Propane tank, 250# WP
1—10' x 50' Crude tower, 18 trays
1—6' x 34' Vacuum tower, 150#
1—2' x 50' tower, 24 trays
3—Welded tanks, 10' x 40', 10' x 30', 5' x 20'
3—St. exchs., 2000, 1500, 480 sq. ft.
9—Oilfield boilers, 125 hp., 275#
1—Ethyl lead plant
3—Penn. comp. 8 x 11 x 9, 12 x 11½ x 13, 10 x 6 x 11
2—Convection furnaces, 4-6 ch tubing
1—Vapor phase cracking furnace
30—Welded storage tanks, 5000, 2000, 1000, 500 Bbl.
1—Waukesha anti-knock machine
6—Hi-vol pumps, 10 x 7 x 18, 10 x 6 x 12, 6 x 4 x 12, 6 x 3 x 8
30—Duplex piston pumps, all sizes
1—10' x 30' asphalt still
6—Steel Bldgs., 20 x 150, 12 x 20, 20 x 40, 20 x 20.
2—Pritchard cooling towers, Adm. Bentube exchanges
1—BS&B Oil & gas separator, 10.7 mcf, 3500 Bbl./day.

COMPRESSOR STATION—BALT., MD.

3—600 hp IR KVG Gas Comp.
1—MWK 2400 sq. ft. adm. exch. 150#

FINAL LIQUIDATION, LEVELLAND, TEX.

6' x 58' ch lined tower, 50#, 21 tray
5' x 40' ch lined vessel, 90#
30,000 ft., 4, 6 in. pipe
5,000 ft. 2", 4", 4-6 ch pipe

EQUIPMENT ELSEWHERE

COLUMNS

7' x 115' 50 tray
8' x 75' 25 tray 40#
2' x 60' 35 tray 560#

HEAT EXCHANGERS

6—Adm. 785, 742, 425 sq. ft.
3—St. 2000, 785 sq. ft.
30—Atmospheric Bentube exch., stls and Adm. 715, 470 sq. ft.
30—304 SS shell & tube condensers 100-1000 sq. ft.

MISCELLANEOUS

Lab Petro-chem furnace 50,000 BTU/hr.
Gould 4" Pump 400 gpm 1600' hd
B-J hot oil pump 3 x 9, 13 st, 325 gpm, 4620' hd
Gould 16" pump 10,500 gpm, 135' hd.
Tremendous selection stainless steel and steel valves ½" - 6"

Partial List Only

WIRE PHONE WRITE

For Detailed Circular

BRILL EQUIPMENT COMPANY

4101 San Jacinto St., Houston 4, Texas, JA 6-1151
Or
2401 Third Ave., New York 51, N. Y., CYpress 2-5701

FOR SALE EQUIPMENT

WILSON MOGUL Double Drum Unit with Waukesha 145 GKU, 87' Double Leg Mast Pole, 6' High 30' Long Substructure, 12" Brewster Rotary, 5"x10" Mud Pump with Waukesha Engine, Tool House, Kelly, Generating Set, Water Tank, Shale Separator, Hand Tools, 3 Years Old. Stored at Odessa. $25,000.00. Norvell-Wilder Supply Co. Phone CA 8-3471 or P. O. Box 2178, Houston, Texas.

CORE DRILLS, SPUDDERS, ROTARIES. New and used equipment. Everything in supplies. Fishing tools rented. Pressey & Son, Pueblo, Colo.

FOR SALE—Bucyrus-Erie Model 24-L Casing Tackle Strut—Power derrick hoist—48 Foot derrick located in Ohio. Sandy Supply Company, P. O. Box 983, Zanesville, Ohio.

NEW PIPE FOR SALE—Approximately 24,000 feet of 1½ inch hydril C. S. joint upset tubing. Pipe located in our yard at Harleton, Texas, sixteen miles northwest of Marshall, Texas. Price F.O.B. our yard $1.25 per foot which price is cheaper than expense of fabrication. Also three new Cameron christmas tree head assemblies for 3,000 lb. w.p. Price $525.00 each. D. E. & R. J. Whelan, ph. 5-3162, Marshall, Texas.

Franks Improved Model 7000 Single Drum Workover Unit complete with Telescoping Derrick mounted on 6x6 FWD Truck for sale by sealed bid. For additional information call or write

Sohio Petroleum Company (WEHLU)
Route 2, Box B-58, Edmond, Oklahoma
Phones: 1080 Edmond
VI 3-5343, Oklahoma City.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units, Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

Stop Tong Breakage!

ARMITE DRILL COLLAR & TOOL JOINT COMPOUND

ARMITE LABS., 8609 Broad St., Los Angeles 1, Calif.
Petro. Industries Consultants, C.A. Caracas, Venez.

HOT OIL PUMPS
Worth. 12" KUF Diesel drive.
Nat. Tr. 4x12 HDOEP Duplex.
Worth. 9x5x10 Duplex.

TRANSFER PUMPS
Duplex from 4x3x4 to 10x7x12

FURNACE TUBES
4-6% Chrome ½ New Cost

TOWERS—COLUMNS
4'x59' 160 PSI 23 trays.
2'x47' 375 PSI 20 trays.
3'x49' 425 PSI 28 trays.
7'x54' 150 PSI 20 trays.
7'6"x41' 160 PSI Reactor.

FURNACES
Crude Oil 8 Million BTU.
Light Oil 10 million BTU.

HEAT EXCHANGERS
94 to 550 sq. ft. Steel Tubes.
140 to 440 sq. ft. Adm. Tubes.

COMPRESSORS
1406 SCFM Gas Driven 250 PSI.
211 CFM Motor Drive 100 PSI.

ETHYL BLENDING PLANT
4200 gal. Tank, Scale & Building.

STORAGE TANKS
500 to 20,000 bbl. All Welded.

BOILERS
153 HP 160 PSI Water Tube (3).
250 HP 150 PSI Stirling.

WRITE FOR COMPLETE INVENTORY

Heat & Power Co., Inc.

60 East 42 Street — **New York 17, N. Y.**
310 Thompson Bldg. — **Tulsa 3, Okla.**

FOR SALE EQUIPMENT

3—6000 GALLON welded gasolene storage tanks, 2—50 HP Vertical GB Superior Gas Engines. Patton & Swab, Inc., 201 Citizens Bank Bldg., Tulsa, Okla.

FOR SALE: 2 Type 80 Cooper Twin Gas Engine Driven Compressors rebuilt like new ready to go. Compressor Cylinders to suit. $4,500.00 each. Write or phone W. S. Smith, 205 Thompson Bldg., Tulsa, Okla. LUther 2-5473.

FOR SALE—Two Walker-Neer Model C-34 Spudders, Trailer mounted. Waukesha 145GKU Engines complete with all drilling-in tools, doghouses, light plants, 7500 ft. ¾" drill lines, 7,000 ft. ⅝" sand line. Inventory on request. Box J-284, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES AND RENTALS. Used cable drilling and fishing tools, casing, production equipment; from the Southwest's largest stock of oil field supplies. Degen Pipe and Supply Co., Tulsa.

FOR SALE—5000' Drilling Rig—Complete for South Texas Drilling—Completely Overhauled—For Price and Complete Inventory write—McKENZIE DRILLING COMPANY, 717 WILSON BUILDING, CORPUS CHRISTI, TEXAS.

EQUIPMENT WANTED

WANTED—Small gas compressor, give make and size and price. Tindall Cotton Oil Corp., Twitty, Texas.

WANTED—Truck mounted 2500 foot rotary rig, must be good shape and priced right. Box 650, Great Falls, Montana.

MAYHEW 1000 with 5x6 Wheatley Pump and equipped for 15' drill rods, 750 gal. class water truck. Trucks should be of late model. TEXAS SEISMOGRAPH COMPANY, Box 2069, Wichita Falls, Texas.

HELP WANTED

WANTED—Junior Mechanical Engineer. Degree preferred but not essential if applicant has refinery, gasoline plant, or chemical plant experience. Give complete work experience, salary expected and personal data in first letter. Write Box J-286, The Oil and Gas Journal, Tulsa, Oklahoma.

SOUTH AMERICA. Major Oil Company. Our Fee paid. Mechanical, Petroleum, Civil and Chemical Engineers—Geologist (must be single)—All requiring Degree, experienced or inexperienced. Tool Pusher, three years experience. On all jobs age limit is 40. All information confidential. Contact CHAS. J. LOVELESS PERSONNEL SERVICE, 616 South Main, Tulsa, Oklahoma—GIbson 7-3193.

MECHANICAL ENGINEERS

Employment Opportunities in SOUTH AMERICA

Attractive staff positions available with affiliates of STANDARD OIL COMPANY (N. J.)

Must be thoroughly qualified and experienced in design and/or maintenance of refinery or chemical plant equipment including piping, pressure vessels, heat exchangers.

Attractive salary, liberal annuity and savings program offered.

Write, giving age, marital status, education and details of previous experience.

Box 308-P

RADIO CITY STATION
NEW YORK 19, N. Y.

HELP WANTED

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

DRILLING SUPERINTENDENT with engineering or technical background, for employment in Italy. Must read and write Italian. Box J-263, The Oil and Gas Journal, Tulsa, Oklahoma.

PROFESSOR OF Petroleum Engineering to be responsible for undergraduate curriculum and graduate courses. M.S. or Ph.D. Interest in research desired and full cooperation of University assured. Rank and salary dependent upon education and experience. University of Illinois, Urbana, Ill. Mining & Metallurgical Dept.

SEISMIC COMPUTER

Age 24-33. Must have degree in geology or geophysics and 2 to 4 years computing experience. Permanent location on Houston geophysical staff of rapidly expanding oil company. Excellent benefits and opportunities. Send complete details of college record and experience to **Box J-280, THE OIL AND GAS JOURNAL, TULSA, OKLAHOMA.**

Oil Company operating a concession in Egypt for Cities Service Oil Company, Continental Oil Company, The Ohio Oil Company, and Richfield Oil Corporation has openings for Micro-palentologist and Rotary Rig Drillers with experience below 10,000 feet. Apply

Egyptian-American Oil Company,
DRAWER 1267,
PONCA CITY, OKLAHOMA.
Attention: DWMOG.

FIELD GEOLOGISTS

Attractive overseas staff positions available for qualified field geologists with STANDARD OIL COMPANY (N. J.)

Must have sufficient experience to assume technical and administrative duties of field party chief.

Assignments may be on a world-wide basis and would include general reconnaissance and regional geological studies.

Liberal salaries, annuity and savings program offered.

Write, giving age, marital status, education and experience in detail.

BOX 308-A
RADIO CITY STATION
New York 19, N. Y.

HELP WANTED

PRODUCTION EQUIPMENT SALESMAN: Illinois, Indiana, and Kentucky. Prefer man already contacting major and independent operaotrs in area. Salary Open. Box J-281, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER, 4 or 5 years experience with emphasis on valuation and Reservoir Engineering. Must be free to travel with Dallas as headquarters. Initial letter application should set out past experience in detail, education and salary requirements. Box J-259, The Oil and Gas Journal, Tulsa, Oklahoma.

INDEPENDENT OIL COMPANY needs graduate petroleum engineer under 38 at Midland, Texas. Must have minimum of two years West Texas experience and be outstanding in testing, workovers and completions. Replies confidential. P. O. Box 3053, Dallas, Texas.

WANTED—By small progressive producing company, man that is presently engaged to supervise the maintenance of widely scattered producing properties located in the mid-continent area. Must be thoroughly familiar with all phases of stripper leases, also a thorough knowledge of workover jobs and well completions. State salary expected along with references and qualifications. All replies confidential. Company office in Dallas. Box J-285, The Oil and Gas Journal, Tulsa, Oklahoma.

MECHANICAL ENGINEER

Cardwell Manufacturing Co. has an attractive position available for a man to do design work on oil field drilling and servicing equipment. Require BSME. Excellent pay and liberal company benefits.

CARDWELL MFG. CO.
BOX 2001, WICHTA, KANSAS.

WANTED

Petroleum Engineer between 28 and 35 years of age with field experience and interest in reserves and valuation work. New York financial institution offers opportunity for experience and advancement. Please send resume of personal history, experience, and recent photograph. Replies will be considered as being strictly confidential. Write P. O. Box 226, Church Street Station, New York 8, N. Y. Dept. 12.

DRILLING EQUIPMENT ENGINEER

Foreign Service

With degree in Petroleum or Mechanical Engineering, plus minimum of 5 years' experience in the design, manufacture, use and maintenance of drilling equipment and supplies. Must have drilling operations experience and knowledge of the various drilling equipment manufacturers and their products. Salary dependent upon experience and qualifications.

Write giving full particulars regarding personal history and work experience. Please include your telephone number.

Recruiting Supervisor, Box 74

ARABIAN AMERICAN OIL COMPANY
505 PARK AVENUE, NEW YORK 22, NEW YORK

HELP WANTED

SEISMOGRAPH Computer. Must be experienced and free to travel. Box J-234, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEER—With mechanical training or experience to work in Company's Houston office, rating and sizing heat exchangers, centrifugal pumps, compressors, and related equipment. Box J-265, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST for South Louisiana. Large integrated independent company desires to hire subsurface geologist for Lafayette Office. Minimum 2 to 4 years subsurface experience preferably in South Louisiana. State qualifications, age, salary requirements, etc. Write Box J-267, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY SUPERINTENDENT—For independent refinery in Houston, Texas area. Applicant must have heavy experience in processing heavy crude. Plant will be manufacturing all grades of industrial and paving asphalts. Salary open. Submit resume of experience along with availability and expected salary to Box J-278, The Oil and Gas Journal, Tulsa, Oklahoma.

CHIEF CHEMIST—For research and plant control. New plant being built in Houston area, manufacturing all grades industrial and paving grade asphalts. Submit resume of experience along with availability and expected salary to Box J-279, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST—Aggressive independent oil company has opening for geologist to headquarter in Midland, Texas. Approximately five years experience in Permian Basin required. In replying, give past employment record, educational background, etc. Replies held in strict confidence. Box J-288, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

EXPERIENCED 25 years major oil company exploration for oil and gas, land deals, development. Available January 1, full or part time. Box J-289, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN or contact representative for drilling contractor available for Rocky Mountain area. 18 years experience Land, Production, Drilling. Box J-282, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, 31, Masters', six years varied experience in Texas, Oklahoma, Colorado, Kansas and New Mexico. Desires change. Box J-280, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION INDEPENDENTS: Experienced land and title man; also capable of managing office and supervising accounting, etc. Box J-274, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST—7 Years Gulf Coast and Mid-Continent experience, desires change. Box J-286, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER-GEOLOGIST, experienced in all phases. Desire position with small oil company or drilling contractor. On salary or salary-participation basis. My employer knows of this ad. Box J-271, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, 31, Ph.D., seven years domestic and foreign experience. Last four years with a major oil company. Able to conduct oil exploration on local or regional scale. Prefer to work with an aggressive independent or consultant who needs ideas and drive. Box J-283, The Oil and Gas Journal, Tulsa, Oklahoma.

EXECUTIVE ASSISTANT OPERATIONS ADVISER

Graduate Petroleum Engineer, 12 years widely varied drilling and production experience with major in Venezuela. Last position was Asst. Supt. Drilling & Production. Good working knowledge pipeline operations, reservoir engineering, gas repressuring plants, budgets and accounting. Desire position in U. S. with aggressive integrated company or independent.

Box J-269, The Oil and Gas Journal,
Tulsa, Oklahoma.

BUSINESS SERVICE

Delaware Corporations formed and serviced. American Guaranty & Trust Company, P. O. Box 487, Wilmington, Delaware.

ROYALTIES

WANTED: Producing Royalties by Principal. Submit, Engineer's report—Run tickets and Price. R. M. Sims, P. O. Box 447—Phone 1024, Crockett, Texas.

NOTICE from The Saudi Arab Government. The Saudi Arab Government hereby gives notice to all concerned that it regards the Buraimi Oasis part of the Saudi Arab territory and that it will not recognize any concession for the production of petroleum and/or any other mineral or minerals or any concession whatsoever granted by any Government or Authority in the said area. Any company or firm or person that enters into such an agreement will be doing so at its or his own risk and the Saudi Arab Government will regard such agreement null and void and will neither be bound by it nor responsible for any consequences.

LEASE AND DRILLING BLOCKS

CONTACT A. L. Bowles, Box 947, Ada, Okla., for Drilling Deals, Oil Production.

OIL LEASE available Lipscomb Co. Texas, Sec. 975, Blk. 43, H. & T. C. R. R. Co. Survey. J. A. Rhomberg, 516 Fischer Bldg., Dubuque, Iowa.

GENERAL MINING COMPANY—Uranium, Minerals, Exploration, Development, Geological and Engineering Surveys. Choice properties available. 144 North Market St., Cortez, Colorado, Telephone 278.

KANSAS WATER FLOOD: 900 acres near Chanute. 2 oil wells, 2 injection wells, 600 ft. depth, pressure pumps, tanks, etc. Sell or take partner. (Owner) O'Chamis, 10863 Bluffside Drive, No. Hollywood, Calif.

LEASES ROYALTIES

Producing and Nonproducing Bought and Sold—Any Area

Inquiries Invited

B. D. BUCKLEY

8635 Delmar Ave., St. Louis, Mo.

MAP CABINETS

END MAP-FILING WORRIES FOREVER! Kraftbilt Rollfiles keep rolled maps safe from dust, dampness, pilferers. Used by all major and hundreds of smaller oil companies. Send for new Catalog 1054-B. Ross-Martin Co., P. O. Box 800-A, Tulsa 1, Oklahoma.

BUSINESS OPPORTUNITIES

PARTIES WANTED to help me drill a well for Oil and Gas on 160 acre lease, on which there was a well drilled in 1916 and they got a good well but for some reason it was plugged. Let me tell you all about this lease and well. Write O. A. Sewell, P. O. Box 103, Coweta, Oklahoma.

A PROPOSITION—A Landman, two Geologists, and one Senior Geophysicist, each with over three years' experience plus college degrees or graduate work, desire financial investments for Oil Exploration in West Texas and New Mexico. Will form small company under three year contract, yearly option basis. Faithful performance bond will be posted equal to investors' shares. Complete Geological, Geophysical, and Land information is available. Write Box J-268, The Oil and Gas Journal, Tulsa, Oklahoma.

STRIP LOG CABINETS

MORE LOGS ARE FILED in Kraftbilt Strip Log Cabinets than all others combined. Loaded drawers glide smoothly on roller bearings. Three drawers per section; add sections as needed. Built to last a lifetime! Send for new Catalog 1054-B. Ross-Martin Co., P. O. Box 800-A, Tulsa 1, Oklahoma.

WANTED

OIL PROPERTIES WANTED. "Oil properties wanted, settled or semi-settled production of 100 to 2,500 barrels daily in Oklahoma and Kansas. Property must stand thorough inspection. Contact Morris Sitrin, 1215 First National Building, Tulsa, Oklahoma with particulars.

ELECTRIC LOG CABINETS

FOR ECONOMICAL FILING of full-size electric logs, most geologists prefer Kraftbilt E-24, 4-drawer cabinet. Two compartments to each drawer with separate follow blocks make this cabinet handy, economical. For filing reduced electric logs, geologists use Kraftbilt E-28 8-drawer cabinet. Send for new Catalog 1054-B. Ross-Martin Co., P. O. Box 800-A, Tulsa 1, Oklahoma.

EQUIPMENT MEN . . . in the News

Le Roi Completes Tulsa Facility

Completion of this extensive branch facility to serve the petroleum and construction industries has been announced by the Le Roi division of Westinghouse Air Brake Co.

Headquarters for Le Roi's southwestern sales region, as well as its petroleum industry headquarters, the new branch plant is located at Tulsa.

In addition to the normal responsibilities of servicing Le Roi products throughout the Southwest, the Tulsa organization has the additional duties of engineering, fabricating, and assembling a complete line of Le Roi gas-booster compressors and air-drilling compressors. The plant also modifies basic Le Roi engines to conform with customer specifications and requirements. The latter expedites delivery of customized equipment. In addition to offices for regional sales and petroleum-industry headquarters and complete modification and assembling facilities, the plant includes a replacement-parts store and an extensive warehouse.

Three Promoted by M-H Industrial Division

Promotion of three field sales engineers to key industrial-division posts has been announced by Minneapolis-Honeywell Regulator Co.

James W. Hughes has been named regional industrial sales manager for the Midwest region with headquarters in Chicago. Raymond A. Zack will become industrial sales manager in the Hammond, Ind., branch office, and Paul R. Sharadin has been assigned to the new position of regional application engineer for the southwestern region with headquarters in Dallas.

According to O. B. Wilson, general sales manager of the industrial division, the new assignments are part of the company's planned expansion to keep pace with technological advances in industrial instrumentation and the rapidly increasing use of automatic-control equipment in industry.

Hughes joined Honeywell as an industrial sales engineer in Charlotte, N. C., in 1946 and was manager of the company's branch office in Birmingham, Ala., before his transfer to Chicago as branch industrial sales manager in 1954.

Zach joined Honeywell's Baltimore branch industrial sales staff in 1949. He was transferred to Chicago as an industrial sales engineer in 1954 and was transferred to the firm's new Hammond office when it was opened January 1, 1955.

Sharadin joined Honeywell as an industrial-controls service engineer in Dallas in 1951 and entered industrial sales work in the company's El Paso office the following year. He has been in charge of industrial sales in Odessa, Tex., since 1954.

Hycalog Names Tooke As District Manager

John Tooke has been appointed district manager of Hycalog, Inc., well-logging and diamond-coring company, for the southern Wyoming, Colorado, Utah area, according to an announcement by J. R. Mayeaux, president. He makes his headquarters in Casper, Wyo.

Tooke has been with Hycalog since 1948, having started as a well-logging engineer. In his new position he is in charge of all services and sales, including well logging, core analysis, diamond-bit sales, and diamond-core-barrel sales.

Burton Named District Manager by Associated

Don P. Burton has been appointed district manager for Associated Oil Field Rentals following the death of Jack Kelley, according to Ralph Neuhaus, the company's executive vice president, in Houston.

"In appointing Don Burton to take Kelley's place," Neuhaus said, "we know it is a great challenge to succeed so capable and so versatile a man. However, in our opinion, Burton will be an outstanding success as our district man-

ager in Oklahoma City and will render the same high type of service which our customers have come to expect.

Tuboscope Announces Five Personnel Changes

C. A. YANCEY

Five changes in personnel in the sales department of Tuboscope Co., Houston, have been announced by B. H. Pickard, vice president and general manager.

C. A. Yancey is now district manager in Shreveport, a new district created in January 1955. W. A. Fox has been transferred to Oklahoma City as

W. A. FOX

V. GOINS

division manager for Oklahoma, Kansas, and North Texas. Vernon Goins is the new division manager in New Iberia, La.

A new sales office has been opened in Denver with Charles Kromer as representative. A new sales office has also been opened in Dallas under the direction of William Penn McIntyre, Jr.

Yancey joined Tuboscope in 1951 in Odessa as a Sonoscope operator. He

C. KROMER

McINTYRE, JR.

was then transferred to sales and has since worked in Abilene and New Iberia.

Fox is a veteran of 10 years with Tuboscope and has seen service in Louisiana, Mississippi, New Mexico, and Texas.

Goins went to work for Tuboscope in Oklahoma City in 1944. He was division manager in Oklahoma City for 8 years before his transfer to New Iberia.

Kromer joined Tuboscope in 1951. He was transferred to Corpus Christi as a sales representative in January 1955, where he was stationed until his transfer to Denver.

McIntyre joined Tuboscope in 1950, working on a Sonoscope crew in New Iberia. He took the first Sonoscope unit to Canada in 1952. Later that year he was transferred to Corpus Christi. In 1954 he was moved to Houston as sales representative.

Tube-Kote Names Ramey As Area Sales Engineer

Bill Ramey has been appointed Tube-Kote, Inc., sales engineer for Oklahoma and Kansas, Lynn Edgar, sales manager of the Houston plastics firm, has announced. He will make Tulsa his headquarters.

Ramey's appointment is in line with recent developments in Tube-Kote's expansion program, designed to provide better service for the company's customers, Edgar said.

In his new position, Ramey will be responsible for introducing in Oklahoma and Kansas the complete Tube-Kote line of services for protecting oilfield and refinery tubular goods from corrosion damage and paraffin deposition.

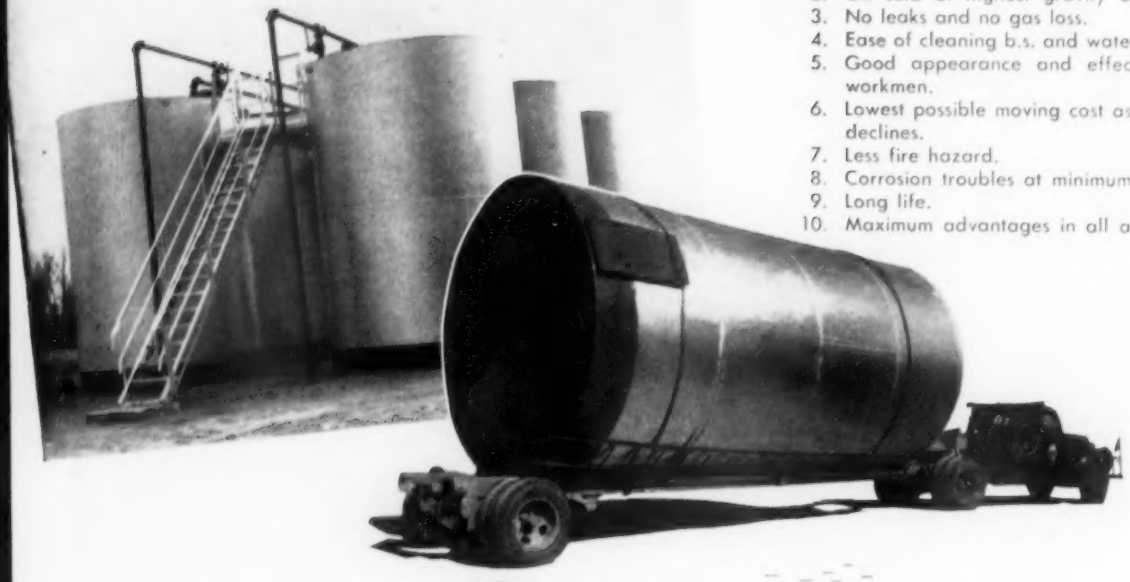
For the past 3 years Ramey was associated with Western Geophysical Co. of America as party manager for offshore exploration crews in Texas and Louisiana.

ADVERTISERS IN THIS ISSUE

ACF Industries, Incorporated, Valve Division 123
Acme Oil Tool Company 149
Aeroquip Corporation 139
Allis-Chalmers Mfg. Co. 26
American Iron & Machine Works Co. 132
Anchor Petroleum Company 40
Armstrong Machine Works 18
BJ Service, Inc., Subsidiary of Borg-Warner Corp. 141
Baker Oil Tools, Inc. 38
Beacon Petroleum Company 29
Beech Aircraft Corporation 81
Bendix Aviation Corporation 17
Bethlehem Supply Co. 102
Bonney Forge & Tool Works 28
Bovaird Supply Co., The 84
Bucyrus-Erie 88
Buffalo Forge Company 33
Butler Manufacturing Company 137
Chevrolet Motor Div., General Motors Corp. 20
Classified Advertising 165, 166, 167, 168
Cleaver-Brooks Company 4
Continental Supply Co., The 154
Crane Co. 79
Crose Manufacturing Co., Inc., M. J. 108
Detroit Diesel Engine Division, General Motors Corp. 14
Dow Chemical Company, The 104
Dowell Incorporated 83, 112
Drilling & Service, Inc. 148
Edward Valves, Inc. 110
Ensign Carburetor Company 13
First National Bank of Shreveport, The 107
First National Bank & Trust Co. of Tulsa, The 149
Gaso Pump & Burner Mfg. Co. 23
Gates Rubber Co., The 96
Globe Oil Tools Company 32
Goodyear Tire & Rubber Company, The 11
Gott Mfg. Co., H. P. 107
Grancell, I. H. 110
Guiberson Corporation 147
Halliburton Oil Well Cementing Co. 15, 126
Hughes Tool Co. Back Cover
Inferno Co., The 119, 149
International Harvester Co. 121
Johnston Testers, Inc. 25
Jones & Laughlin Steel Corporation Supply Division 131
Kelley Company, Ben F. 21
Kellogg Co., The M. W. 143
Kinzbach Tool Co., Inc. 16
Leland Equipment Co. 128
Le Roi Division of Westinghouse Air Brake Co. 146
L-K Pump Valve Company 7
Lone Star Steel Company 95
Macco Oil Tool Co. 31
Mack Trucks 117
Macwhyte Co. 8
Magnet Cove Barium Corp. 5
Maloney-Crawford Tank & Mfg. Co. 97
Martin, Manufacturer, John N. 12
Mayo Hotel, The 22
McKee & Co., Arthur G. 119
Miller Sand Pump Co. 19
Muldrow Aerial Surveys Corp. 149
National Aluminate Corp. 136
National Bank of Tulsa 77
National Tank Company 151
Naugatuck Chemical Division of United States Rubber Company 170
Nicolet Industries, Inc. 34
Norris Manufacturer, Inc., W. C. 107
Oil and Gas Journal, The 36
Oil Well Supply Division 128
OPW Corporation 6
Orbit Valve Company 10
Otis Pressure Control, Inc. 118
Parkersburg Rig & Reel Co. 35
Peerless Supply Co. Inc. 156
Petroleum Distributing Co. 117
Petroleum Service Management Company, Inc. 119
Raybestos-Manhattan, Inc., Packing Div. 117
Reda Pump Company 120
Republic National Bank of Dallas 117
Rockwood Sprinkler Company 94
Ross Heat Exchanger Division of American-Standard 9
R-P&C Valve Division American Chain & Cable 109
Schlumberger Well Surveying Corp. 138
Smith Company, Tyson 153
Smith Oil Tool Co., H. C. 140
Solar Aircraft Company 30
Southwestern Plastic Pipe Co. 100
Stearns-Roger Mfg. Co., The 111
Tapecoat Company, The 159
Templeton, Kenly & Co. 122
Thornhill-Craver Co. 128
Timken Roller Bearing Company Inside Front Cover
Tube-Kote, Inc. 114
Tulsa Winch Division of Vickers Incorporated 134
United States Rubber Company, Naugatuck Chemical Division 91
United States Steel Corporation—Oil Well Supply Division 34
United Steel Companies Limited 6
Well Equipment Mfg. Corp. 144
Wheland Company, The 150
Williams Brothers 133
Wilson Manufacturing Co., Inc. 106
Wilson Supply Company 27
W-K-M Manufacturing Company, Inc., A Subsidiary of ACF Industries Incorporated 142
Woodward Governor Company 24
Youngstown Sheet and Tube Company Inside Back Cover

ADVANTAGES OF NATIONAL WELDED STORAGE TANKS

1. 100% vapor recovery (pressure or vacuum).
2. Oil sold at highest gravity at all times.
3. No leaks and no gas loss.
4. Ease of cleaning b.s. and water.
5. Good appearance and effect on lease workmen.
6. Lowest possible moving cost as production declines.
7. Less fire hazard.
8. Corrosion troubles at minimum.
9. Long life.
10. Maximum advantages in all above cases.



NATIONAL *Welded* STORAGE TANKS

Since 1927, thousands of National Welded Storage Tanks have been placed in service in the oil fields throughout the world. Many hundreds of tanks are still in service after 20 years, during which time innumerable moves have been made without leaks or failures.

For the storage of salt water cut crude, National devised the now famous coned bottom tanks with a built-in water and b.s. trap in the bottom for periodic bleeding off of those corrosive elements.

National was one of the first manufacturers to join in the adoption and production of API-P & M lease storage welded tanks.

National Standard Welded Storage Tanks are available in capacities from 65 bbls. to 400 bbls.

It's National

NATIONAL TANK COMPANY

TULSA, OKLAHOMA

WHAT'S COOKING?

A "batch" of the finest steel you could possibly want—that's what's cooking.

Of course, we have many and many a "recipe" for fine steels and in this particular case it's steel for the production of YOUNGSTOWN ELECTRIC WELD LINE PIPE.

Yes, we at YOUNGSTOWN spend many hours over a "hot oven" cooking up things (mainly fine steels of course) for industry. However, unlike the cooking that Grandma used to do—with a "pinch of this" and perhaps a "dab of that"—our cooking is done strictly by the book . . . there is no guess-work about steel making at YOUNGSTOWN.

Continuous day-by-day research and development makes possible a more efficient and economical operation and naturally a finer product.

So, today, when you order Youngstown Electric Weld Line Pipe, you can be assured that you are buying more than "just pipe"—you are buying years of experience in the making of steel of the highest quality—you are buying a longer lasting, more economical product—you are buying more years of trouble-free service—you are buying YOUNGSTOWN QUALITY AND SERVICE.

QUALITY YOUNGSTOWN SERVICE

Youngstown

ELECTRIC WELD LINE PIPE

THE YOUNGSTOWN SHEET AND TUBE COMPANY *Manufacturers of Carbon, Alloy and Yoloy Steel*

General Offices Youngstown, Ohio District Sales Offices in Principal Cities.

SHEETS - STRIP - PLATES - STANDARD PIPE - LINE PIPE - OIL COUNTRY TUBULAR GOODS - CONDUIT AND EMT - MECHANICAL TUBING - COLD FINISHED BARS - HOT ROLLED BARS - WIRE - HOT ROLLED RODS - COKE TIN PLATE - ELECTROLYTIC TIN PLATE - BLACK PLATE - RAILROAD TRACK SPIKES - MINE ROOF BOLTS

We cover the "wildcats", too!

Ours is not a spot service. The more than four hundred members of Hughes Tool Company's service and sales organization cover every active drilling area in the United States and Canada.

You can be sure that the Hughes field serviceman who calls at your rig — regardless of where it is located — will have the right bits there . . . *ahead of time!*

Along with your Hughes bits you get the industry's greatest accumulation of drilling information . . . gathered from hundreds of thousands of wells and from every type of formation.